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ABSTRACT

The identification of talent, and the understanding of its development and origins in terms of biographical data were investigated. The three central objectives were: to construct separate empirical procedures for Anglos and Blacks to predict certain academic performance criteria; to construct an empirical scoring procedure that could predict estimated family income in order to provide information about the socio-economic and biographical correlates of such data; and finally, to conduct a separate analysis on the five most integrated schools in the sample to examine the interrelationships of the measures in this selected sample. The paper surveys the literature, discusses the procedure used to construct the Biographical Inventory (BI), presents reliability and validity data on the instrument, analyzes various aspects of the sample, and discusses the differential measures of some biographical corrleates of family income as indicated in the sample by the BI. The BI keys constructed were found to be substantially more valid in predicting academic performance and college attendance than IQ, College Boards or other non-biographical predictors. Keys built on Blacks were as valid for Anglos as keys constructed on Anglos. Blacks were equal or slightly superior to Anglos in academic performance and creativity when the family income variable was controlled; and Blacks scored significantly lower on intellectual tests even when the effects of family income were controlled. Statistical data and a bibliography are included. (AE)

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U.S. DEPARTMENT OF
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INTRODUCTION

The biographical correlates of talent and achievement, or what might be better termed non-intellectual measures of performance, cover an area of research that has been growing rapdily, with the availability of high speed computers, especially during the past 10 years. The biographical approach has been used to identify a wide variety of different kinds of talents including successful performance among scientists, executives, nurses, graduate students, army officers, etc. This research approach has not been typical of the usual techniques for the identification of talent which has primarily been restricted to intellectual measures, including achievement, intelligence and academic aptitude tests. In order to consider the potential contribution of the biographical approach presented in this research, it will be helpful to digress and briefly review the context within which such procedures would be used.

The growth and scope of testing programs in the U.S. has reached such a level that there can be no doubt about our national committment to testing. Goslin (1963) has estimated that there are more ability tests being given annually than there are people. In 1961, commercial test publishers sold test booklets and answer sheets valued at over $11,000,000. This represented an increase of more than 100% over the sales 7 years previously (Goslin, 1963). Ostensibly, the majority of the tests in the intellectual sphere are concerned with the identification of talent -- the selection of the gifted -- and the measurement of achievement. In a practical sense, the scores from these tests provide a basis for making rational decisions about the selection and placement of individuals in a wide variety of situations and organizations.

In the case of college freshmen, who provide a substantial market for the testing industry, the tests are primarily used to designate the intellectual elite from those who are less academically qualified. If the effectiveness of these measures is gauged in terms of how well they predict college academic performance, the results vary depending on the selectivity of the institutions. Generally, however, the zero order correlations vary around .50 (Levin, 1965). Such relationships can be explained in a number of ways. For example, approximately 25% of the variation in college grades can be predicted or explained by college entrance scores; alternately, 75% must be attributed to other factors such as random variability in college grades, motivation, study habits, etc. A more practical interpretation can be obtained through the use of some percentage of correct classification system such as the Taylor-Russell Tables (1939). To take an hypothetical example, with a correlation of .50, if one wanted to identify in advance those students who would be in the top 30% of the class and selected the top 30% on the entrance test scores, 52% out of those selected would be in the top 30% and would be correctly classified, while 48% of those selected on the basis of test scores would not be in the top 1/3 of their class[1]. Also, 74% of those selected would be above average, i.e., in the top 50%. Carrying the example still further, approximately 26% of those scoring in the top 30% of the test scores would be below average in college grades.

The above illustrations indicate that intellectual tests do have some utility as selection devices for their best area of prediction, although there is room for improvement. Utility, in this case, is defined in terms of effectiveness in predicting college grades. Since college grades have shown at best only limited utility in predicting relevant measures of adult achievement (Hoyt, 1966; Taylor and Ellison, 1967), the entire system of intellectual tests and our present education process can be questioned on empirical grounds as well as by student protestors who cry for greater relevance.

Our current intellectual and achievement tests have other characteristics which have stimulated a great deal of controversy, namely the extent to which they discriminate or differentiate unfairly between Anglos and Blacks[2] and other culturally disadvantaged groups.

Discussions of this issue have been reported widely in the popular press - Life (June 12, 1970) - and in such prestigious scientific journals as Science and the Harvard Educational Review. Although a wide array of opinions have been presented, they essentially vary around two contrasting positions: (1) that the differences between mean scores of Blacks and Anglos on standardized intelligence tests probably reflect genetic differences in certain aspects of intellectual functioning (Garrett; 1960, Shuey, 1966; Jensen, 1969), (2) that these test score differences merely reflect the lack of opportunity and the inadequate state of social development which characterize our culturally disadvantaged groups.

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[1] These examples do not include high school grades, the quality of the high school or other factors which are often combined with entrance test scores in multiple regression equations to predict college success. The correlations of these combined variables with college grade point average may achieve a level of .55 to .65 or higher, depending upon the institution and the number of variables in question.

[2] This style has been adopted in accordance with its increasing frequency of usage, e.g., Ruch (1970).

These debatable characteristics of intellectual selection devices, particularly for college entrants, has brought forth a variety of views. In a recent editorial in Science, Wolfle (1970) posed two extreme points of view: "When the number of eligible people exceed the number who must bear a particular burden or who can receive a particular benefit, the most democratic, equitable, and moral basis for allocation is by chance." This was contrasted with "To use a lottery to allocate risks or benefits is not only a denial of rationality, it is also a denial of man's humanity; each man is reduced to a cipher, distinguished from other ciphers only by the uniqueness of the combination of digits that identify his records in a growing number of office files" (p. 1201).

This polar statement of the issues brought forth a response by Ashby (1970) that decisions, to be rational and defensible, must be based on information and the more information available the more appropriate the decisions.

Earlier, a similar discussion of these issues was also reported in Science. The initial articles were by Nelson (1969a, 1969b) who presented data which argued that Blacks were underrepresented in our college population and that an important part of such underrepresentation was due to screening by the college entrance exams.

These articles brought forth responses from Stanley (1969) who argued that the predictiveness of the entrance tests apply at least as fully to the disadvantaged as to the advantaged. He suggested that changes in the curriculum be developed to prepare the disadvantaged for adequate performance at the college level, although he knew of no evidence to support the proposition that students initially low in high school grades and academic aptitude scores catch up. Humphreys (1969) took a similar position, arguing that the colleges were damned if they did admit Blacks as their high failure rate would lead to frustration and aggressive behavior, and damned if they didn't because of pressures for social advancement.

To summarize briefly, the issues presented about the applications of intellectual tests involve the following:

(1) Our society has broadly accepted and institutionalized testing practices which involve a large financial and social investment - a committment which could be difficult to change.

(2) The intellectual tests generally have a moderate level of validity in predicting academic criteria.

(3) The criteria of academic performance which many of the tests were designed to predict have at best shown very limited relationships to measures of professional accomplishment.

(4) The tests do distinguish, fairly or unfairly, between Anglos and Blacks.

This brief review of the characteristics of intellectual tests will provide an opportunity for comparing and evaluating the results obtained from the present investigation which examined an alternate approach to the identification of talent - the use of non-intellectual or biographical data.

Review of Biographical Studies

The use of biographical information has a long and successful history as a selection procedure, but it has been only relatively recently that extensive systematic research has begun to accumulate. The term biographical information refers to a collection of multiple choice questions in which an individual describes himself and his background, with many of the questions being similar to those found on an application blank. The rationale in using such an approach is very simple - that past behavior can be used as an indicator of future behavior and performance.

One of the first known uses of scientifically scored biographical data originated with Goldsmith (1922) when she wrote on "The Use of a Personal History Blank as a Salesmanship Test." Another early example is a study by Bittner (1945), who utilized biographical information to predict college attendance or non-attendance. On the basis of earlier experience with biographical data and the retention of U. S. Army Officers, Hansen, in 1950, demonstrated that biographical data could be used to predict high school GPA and over and under achievement with cross validities as high as .60.

An early program of research was reported by Parrish and Drucker (1957) covering a 16 year period by the AGO, USA, which indicated that biographical information was the most consistently successful device for predicting peer and tactical officer ratings of leadership in OCS (r=.45). A closely related study by Roy, Brueckel and Drucker (1954) found biographical information more valid than any combination of 10 tests of aptitude, attitude and physical proficiency in predicting ROTC leadership ratings of officers and cadet peers at six schools (n=2003). A more recent example is a study by Williams (1961), who utilized only 21 items and was able to predict volunteering vs. non-volunteering for an advance A.F.R.O.T.C. program to the extent of an r of 0.72 in an untouched prediction sub-sample of over 200 cases.

In the majority of biographical information studies, the criteria have involved world of work performances such as leadership, creativity, reenlistment, etc., which have been relatively impervious to prediction by more conventional procedures. It was in this context that the early developmental research originated which laid the foundation for the instrument used in the present study.

In the late 1950's small studies by Taylor (1957) and Ellison (1959) indicated that biographical data had promise for making a significant contribution to the identification of scientific talent. On this basis, a four year study was initiated in 1959 (Taylor, Ellison and Tucker, 1964; Taylor and Ellison, 1967) to evaluate the effectiveness of biographical data in predicting a variety of scientific performance criteria including supervisory ratings on creativity, quantity of work, quantity of publications and patents, etc. The studies involved over 2,000 scientists and engineers at several NASA research centers. The results showed that creativity and other scientific performance measures could be predicted by biographical data with cross validities ranging from .30 to .59.

Later, three industrial studies on the biographical correlates of scientific and engineering talent on another 1,000 scientists and engineers[3] confirmed the general effectiveness of biographical data in predicting different criteria of scientific and engineering performance, including measures of creative performance (i.e., publications, patents, supervisory ratings) and a number of job performance criteria other than creativity, such as salary (corrected for education and experience), communication skills, group leadership, breadth of knowledge, etc.

In order to determine the validity of the biographical approach in predicting undergraduate academic performance, a new form of the Biographical Inventory (BI), Form J, was developed. This form included the previously validated creativity items and a number of new items constructed specifically to predict academic performance at the college freshmen level (IBRIC, 1968). Form J of the BI was administered to the freshman class at Ohio University in November, 1966. The grade point average for the first semester of the freshman year was also acquired later. The size of the sample on which complete data were finally received included 1,525 females and 1,439 males. An item analysis of the BI against the first semester grade point average resulted in cross validities of .60 for females and .58 for males.

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[3] Ellison, R. L., James, L. R., & Carron, T., 1968; Ellison, R. L., James, L. R., McDonald, B. W., & Taylor, C. W., 1968; Ellison, R. L., James, L. R., Fox, D. G., & Taylor, C. W., 1968.

In view of the positive results obtained at the college level and because of the availability of a creativity score validated on adult scientists and engineers, interest was generated for a large study of North Carolina high school students. In this study (IBRIC, 1968), high school versions (grades 9 - 12) of the BI (Forms L and M, which were very similar to Form J and the Alpha form developed later, IBRIC, 1968) were constructed and administered to a sample of over 11,000 high school students in North Carolina. It was this large mass of data that provided the opportunity for the present study.

The results from the initial processing of data (IBRIC, 1968) from the North Carolina study indicated that the BI Academic Performance score was consistently more valid in predicting the academic performance criteria - grades and teacher evaluations - than any of the other 24 scores obtained from intelligence tests and achievement measures. Cross validities for the Academic Performance score were .70 for Anglo males, .67 for Anglo females, .43 for Black males, and .43 for female Blacks in predicting rank in class. Equally important, the Academic Performance score did not show the usual pattern of discrimination in terms of race (a correlation of .02 was obtained between the BI Academic Performance score and the binary variable of race, where Blacks were coded as 1 and Anglos as 2)[4]. As stated previously, these results showing a lack of racial discrimination are in marked contrast to conventional approaches to the identification of talent.

The Creativity score, based on the responses of the NASA and industrial scientists and engineers, had a pattern of low to moderate relationships with conventional measures of talent and criteria of academic achievement (e.g., a correlation of .44 was obtained with the SAT total score). Since no relevant creativity criteria were included in the study, it was not possible to evaluate the actual validity of the Creativity score. The correlation of .44 with the SAT in conjunction with the correlation of .22 with high school GPA suggests that the Creativity score measures a component of intellectual effectiveness, which is not as strongly associated with the more conforming academic achievement measures of GPA. This is supported by studies by Taylor (1963, 1964a, 1964b), Hoyt (1966) and others which indicate that GPA measures typically have a low relationship to scientific creativity. The Creativity score was also independent of race, with no significant difference beween the scores for Black students and Anglo students.

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[4] The coding of Blacks and Anglos was revised from the earlier study, reprinted in the Alpha Manual (IBRIC, 1968) in order to simplify the interpretation of some of the relationships in the present study.

Results have recently been obtained in a number of institutions which support the potential contribution of biographical data in predicting college performance as distinct from high school performance where more validity evidence is available as described previously.

In a study at Wake Forest University, Price (1969) reported that the Academic Performance score of the Alpha BI had a validity of .41 against GPA on a sample of 630 freshmen. The SAT Verbal and SAT Mathematical had validities of .36 and .31 on the same sample[5].

A follow-up study of 835 students who completed an early version of the Alpha BI in the North Carolina study as high school seniors and then entered a variety of four year colleges revealed a somewhat similar pattern of results (Britt, 1970). The validities of the Academic Performance score across the institutions studied were .47 for males and .43 for females. The validities for the SAT Verbal and SAT Mathematical were .31 and .25 for females and .33 and .25 for males. The validity of high school grades in predicting college grades for these students was .40.

It is believed that these findings potentially represent an important contribution to our understanding of talent and how to identify it at an early age without discrimination in terms of race. These findings were obtained for a number of reasons:

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[5] Although the students were selected on the basis of their SAT score, the data indicated an equivalent amount of restriction of range for the Alpha Academic Performance score. It was also of interest to note that the Creativity score contributed to the prediction of GPA in a multiple regression equation as a suppressor variable, correlating significantly with SAT Verbal (.28) and the Alpha Academic Performance score (.42), but had an essentially zero relationship with the GPA criterion.

1. The Biographical Inventory is composed of a large collection of carefully screened, heterogeneous, multiple choice items that have been extensively validated to predict a variety of relevant performances. These items measure a variety of past behaviors and environmental pressures across situations encountered in an individual's background and thus the items can be scored to predict a number of performance criteria in different settings.

2. All the empirically constructed keys from the Biographical Inventory which were essentially free of racial bias were constructed upon samples where the criterion measures themselves were not biased in terms of race. Hence, the keys generally paralleled the criteria and did not discriminate in terms of race. For example, the Creativity Key was constructed on many samples of Anglo scientists and engineers; therefore the keys reflected performance yet did not discriminate in terms of race. The same is true of the Academic Performance keys which were constructed at a large Midwestern university where Blacks comprised such a small part of the student population that there was essentially no racial bias in the Academic Performance key constructed to predict first semester grades.

3. The rank in class and grade point average criteria in the North Carolina study were not racially biased to any appreciable extent since the vast majority of schools studied were segregated according to race.

This combination of events resulted in the Biographical keys being highly valid and at the same time not discriminating in terms of race.

Because of the highly significant results that were obtained in the North Carolina study and because of the important implications for the identification of talent and understanding its social and cultural antecedents, it was believed that these data warranted further analysis. This evidence led to the present study.

In the data analysis already completed, all available measures were intercorrelated and empirical keys were constructed from the biographical data to predict selected measures. Separate empirical keys were constructed to predict rank in class, grade point average, and IQ on the total sample. However, the general level of prediction tended to be somewhat lower for Blacks than for Anglos. Therefore, there was a real need to build new empirical keys on Anglos only and on Blacks only to predict rank in class and grade point average. For example, the key constructed to predict grade point average on the total sample cross validated on Anglos with a cross validity of .68, while on Blacks the cross validity was .57. For the key constructed to predict rank in class on the total sample, the cross validity for Anglos was .71 and the cross validity for Blacks was .48. Both Biographical Inventory keys were consistently more valid for both Anglos and Blacks than any of the other non-biographical measures included in the analysis. This same pattern was apparent across all remaining variables, with Anglos being generally more predictable than Blacks.

Another important step in utilizing the data fully concerned the construction of an empirical key to predict estimated family income. The income measure was provided by the schools and proved to be a very meaningful variable throughout the analysis, as it correlated .51 with race and had a number of other moderate relationships (correlations in the .30's and .40's and occasionally higher) with other variables included in the analysis. It was believed that an empirical key constructed to predict this measure from the biographical data would yield valuable information about levels of achievement and the attitudes, self-descriptions, and enviornmental characteristics associated with family income.

Finally, a further analysis of the North Carolina data was warranted in terms of a separate examination of the small number of schools which were partially integrated. For example, the students in the five most integrated schools could be combined to provide a sample of approximately 300 Black students and 1,000 Anglo students. It was anticipated that these schools would more adequately represent our present state of social development where Blacks and Anglos may have different levels of achievement in academic performance. Such a subsample would be valuable for a more thorough analysis of the relationships among all the measures, particularly the validities of the Biographical Inventory keys.

To summarize, the specific objectives of this research were as follows:

- To construct separate empirical keys on Anglos and Blacks for predicting rank in class and grade point average.
- To construct an empricial key for predicting estimated family income and thereby provide information about the socio-economic and biographical correlates of such data.

- To conduct a separate analysis on the integrated schools to examine the interrelations among all measures used in this selected sample.

The literature review so far presented has been primarily concerned with research findings dealing with biographical literature. Since other areas of research are also relevant to the above objectives, these will be briefly reviewed in the next section.

Other Related Literature

Levin (1965) in reviewing the professional literature on the prediction of academic performance reported that socio-economic level was directly related to academic performances in 13 studies. Of special interest were six studies whose findings contrasted with these results, i.e., socio-economic status (SES) was inversely related to performance. After reviewing all of the studies, Levin felt that the results varied with the kind of samples studied. Within upper classes the relationship was negative, while within middle classes it was positive. He went on to suggest that differential motivation may be a possible explanation (i.e., middle classes use school to increase status while upper classes use it to maintain their level) together with differences in attitudes (i.e., middle looks toward progress and achievement while upper looks toward tradition). He concluded that:

> SES is a significant variable in the study of performance. . . . .what is needed is a thorough review of the differences in personality, values-systems, and behavior that are related to SES. Such class-related variables can then be applied to the study of achievement in school (p. 127).

The present study will provide additional information about the life history correlates of family income.

Dreger and Miller (1968) state that matching of social groups by social class variables is not a solution to a true matching on environmental variables.

> Nevertheless, it is at this point probably the only way in which a measure of equating can be achieved experimentally in the United States. Therefore, attention should be paid to results obtained when such matching is attempted (p. 15).

Summarizing more than a dozen studies, Pasamanick and Knobloch (1958) concluded that both socio-economic facts and neurological factors are responsible for educational retardation. They assert that nutritional factors seem to be implicated in complications surrounding pregnancy and in prematurity, factors which presumably are directly related to socio-economic status.

In summarizing this literature, Dreger and Miller comment upon the psychological dynamics of lower income status as follows:

> Although the expressed vocational level of aspiration may be high, the functional levels of striving of the lower-class child are low, and failure leads to loss of academic interest and a perception that the child cannot achieve because of his status. It follows, then, that failure comes in developing the "ego maturity" that is necessary for success. In addition, the fact of caste membership for the Black child acts as an ultimate barrier, so that finally self-depreciation and primarily passive-aggressive retaliatory mechanisms develop (p. 28).

This review has not confronted directly the complex issue of intelligence and other differences in Black and Anglos, first, because such a review is beyond the scope and focus of this study and secondly, the investigators believe that most conclusions are premature in view of the complexities involved. As illustrated by Dreger and Miller (1968) . . .

> The situation has become clearer that psychological reactions of the sorts compared here are not the simple product of "heredity" and "environment" grossly undefined, but of specific interactions of specific variables. Of these variables the following may be named as having been investigated in some combinations or others; societal and cultural goals, including ideologies; community structure and goals; geographical locale; socio-economic status; caste status; child-rearing attitudes and practices; family structure; positions, roles, and role expectancies; gene patterns, themselves a congeries of variables; neurological status; sex; biochemical functioning; prenatal experiences; perceptual development, including time and space perception; language development, including speech communication complexities and expectancy patterns; self-concepts and attitudes, particularly self-esteem; levels of aspiration, real and expressed; expressive opportunities, including vocational; peer relations; individual psychodynamics and group sociodynamics; cognitive expectancies relating to functions served by different types of cognition; cognitive styles, individual and social; measurement instrument variables; examiner variables; and immediate situational stimulation.

They close their review with an exquisite statement that would only take a staff of many Ph.D.'s many, many years of effort to achieve . . .

> Perhaps the ideal experimental design for analyzing the now more or less recognized complexities would be a multivariate analysis of variance with interactions reaching to the 25th order or a canonical correlation analysis with an expectancy of at least 10 roots (p. 548).

PROCEDURE

Data Collection and Description

As previously discussed, two 300 item forms of the Biographical Inventory, Forms L and M, were administered to over 11,000 ninth and twelfth grade students in North Carolina during the last half of the 1966-1967 school year. These forms were developed on the basis of previous research completed at several scientific research centers and at Ohio University. Valid items for predicting creativity and other job performance criteria from the scientific performance studies and valid items which correlated with academic performance in the Ohio study were included in the two forms. These items were carefully screened, reviewed by test construction experts, and revised where necessary to ensure that the items were appropriate in content and clarity for administration at the high school level. Forms L and M were given to the 9th and 12th grade students, respectively. These two forms were identical except for the last eight items which were aimed more directly at activities appropriate for each grade level.

The BI's were not adminsitered under stringent conditions. Some students completed the BI in the classroom in one session, others were given two such sessions, and a third group completed the BI at home. At present, data are not available to determine which, if any, of these procedures is better than the others. In other studies conducted at scientific research centers, the BI's have been completed at the subject's convenience.

The collection of the North Carolina data was directed by Dr. Craig Phillips in association with Dr. Hugh Peck, Dr. James Sifford, and Dr. H. T. Connor, of the Smith Richardson Foundation. Data were collected from 39 schools in nine school districts representing a stratified random sampling of North Carolina high school students. In each of the nine participating school districts, the school superintendent, or one of his assitants, assumed the responsibility for promoting and coordinating the activites at the local level.

Table 1 lists the variables from the previous North Carolina study which were selected for the present study. With the exception of variables 3, 12, 13, 14, and 15, all of the variables listed in Table 1 were obtained from school records during the same time period in which the BI data were collected. Variable 3 was a binary

Table 1

Selected Variables from the North Carolina Data

1. Race (1 = Black; 2 = Anglo)
2. Estimated Family Income
3. Attended College (0 = No; 1 = Yes)
4. Anglo and College preparatory = 1; Other = 0
5. Black and College preparatory = 1; Other = 0
6. Rank in Class
7. California IQ Test, Total Score
8. College Board, Verbal Score
9. College Board, Quantitative Score
10. College Board, Total Score
11. Overall GPA
12. Likeability
13. IBRIC Creativity Key Score
14. IBRIC Male GPA Key Score*
15. IBRIC Female GPA Key Score*
16. Grade (1 = Ninth; 2 = Twelfth)
17. Sex (1 = Male; 2 = Female)
18. Age

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*In the Introduction these variables were described as the BI Academic Performance Score.

college attendance variable obtained in a follow-up study by Britt (1970). The college attendance data were collected during the 1968-69 school year, and therefore were limited to some extent in that those students who were delayed for some reason (e.g., military service) more than one year between high school graduation and starting college were not included. Ninth grade students were not given a score for this variable.

The likeability measure (variable 12) was a control score based on teacher ratings of cooperativeness and desirability as a student which were collected in conjunction with student evaluation forms completed by the teachers (James, Ellison, McDonald, & Taylor, 1968).

Variable 13 was the a priori IBRIC Creativity Key used in the original North Carolina study. This key was developed on the basis of the NASA and other industrial studies. Variables 14 and 15 were scores from the a priori IBRIC GPA keys developed in the Ohio University study and used in the original North Carolina study.

The remaining variables in Table 1 are self-explanatory with the possible exception of variable 2. Estimated family income (variable 2) was obtained from school records and was scaled as follows:

1 = $3,000 or less per year.

2 = From $3,001 to $5,000 per year.

3 = From $5,001 to $7,000 per year.

4 = From $7,001 to $9,000 per year.

5 = $9,001 or more per year.

The rank in class variable, as originally obtained, was each student's position in his class (based on GPA) divided by the number of persons in that class. This method of scaling resulted in a sign reversal when compared to other academic performance measures and differences in means and standard deviations between schools. Rank in class was therefore revised by standardizing each school to a mean of 500 and a standard deviation of 100 and reflecting each score about the mean. The resulting rank in class variable was therefore independent of school size and school grading differences.

Data Analysis

Table 2 lists the samples which were selected for purposes of generating BI keys, the number of cases in each sample, and the criteria on which keys were developed for that sample. The "odd" designation in Table 2 refers to students with odd identification numbers which were assigned to the BI key generation samples, while students with even identification numbers were assigned to the cross validation samples. Since identification numbers were assigned randomly within schools, the above split was essentially the same as a random selection of students to samples within schools.

Table 2

Samples on Which Keys Were Generated

Sample Name	n	Criteria on Which Keys Were Developed
1. Odd cases from the Total Sample (combined Anglo and Black Samples)	5524*	Rank in Class, GPA, Family Income, College Attendance
2. Odd cases from the Total Anglo Sample	4153	Rank in Class, GPA
3. Odd cases from the Total Black Sample	921	GPA
4. Odd cases from the five most integrated schools	673	GPA

*Data on race were not available for 450 of the odd cases from the total sample.

As illustrated in Table 2, four samples were employed for the generation of BI keys. The odd cases from the total sample included all cases used for key generation. The odd cases from the total Anglo sample and from the total Black sample included all of the students on whom race information was available. The odd cases from the integrated schools sample included Anglos and Blacks from the total sample who were attending the five most integrated schools.

Four BI keys were developed on the total sample. The rank in class and GPA keys were constructed on the total sample in order to make comparisons in terms of validity with the BI keys constructed on Anglos and Blacks separately. The total sample family income key was developed to provide information about the attitudes, self-descriptions, and environmental characteristics associated with family income. Finally, a BI key was developed on the total sample to predict whether or not a student had attended college. It was anticipated that the biographical correlates of this key would provide additional important information concerning the relationships between family income and achievement and later academic performances.

Separate GPA keys for males and females were not constructed, as in the previous study the IBRIC male GPA keyscores (only males scored) and the IBRIC female GPA keyscores (only females scored) both correlated .88 with the empirically derived total sample GPA keyscore. These high part-whole intercorrelations between the keyscores demonstrated the similarities of item scoring in the separate male and female keys. An item content and scoring analysis further substantiated the similarities of the two keys. For these reasons, males and females were combined for all BI key construction in the present study.

Separate BI keys were constructed to predict GPA for the Black sample and Anglo sample. Since previous GPA keys had been built on predominantly Anglo samples, an increase in prediction for the Black sample was expected from the key developed specifically for Blacks. However, for the same reason, a substantial increase in prediction for the Anglo sample was not expected, although some increase was hopefully anticipated. The small number of Blacks for whom the rank in class variable was available prevented the construction of a new BI key for rank in class on Blacks. A rank in class key was constructed, however, on the Anglo sample in order to determine if any increase in validity might be available for this sample.

The last key to be constructed was the BI key generated to predict GPA for students in the five most integrated schools. This key provided an opportunity to investigate the relationships of biographical data with other measures, such as academic achievement, which were assumed to be different for Anglos and Blacks within the same school setting. This opportunity was not available in the total sample because of the low percentage of total integration in that sample.

Each sample was analyzed separately to establish the scoring weights for the items which differentiated between various levels of performance on each of the criterion measures for that particular sample. More specifically, biserial and point biserial correlations were computed for each item alternative with each criterion within each sample. After these correlations were computed, all the correlations were screened for statistical significance. A scoring key was then generated for each criterion consisting of all alternatives in the BI which had significant biserial correlations with that criterion. The alternatives with significant positive correlations were weighted plus 1 and those with significant negative correlations were weighted minus 1.

Biographical keys to predict all selected criteria across all samples were generated in one run on the University of Utah Computer Center's Univac 1108, utilizing a program originally developed by IBRIC personnel. In addition to the keys, output from the program included, for each BI item with each selected criterion within each sample, the percentage of individuals choosing each item alternative, the actual number of individuals responding to each alternative, and the criterion mean for those individuals who selected each alternative. The program also provides the biserial and point biserial correlations of each item alternative with each criterion and the standard error for the biserial together with the eta coefficient of the total item continuum with each criterion and the standard error of the eta.

In the construction of a scoring key for the analysis of biographical data to predict an outside criterion, the emphasis is usually placed on obtaining a very high cross validity coefficient for the key in predicting that criterion on an independent sample. This in turn is a function of at least four parameters: (1) number of items; (2) the magnitude of the correlations of individual item alternatives with the criterion; (3) the expected stability of the item alternative-criterion correlation which in turn varies with the significance level; and (4) item heterogeneity. In the analysis of the present data, different strategies were utilized in order to obtain keys which would produce high cross validity coefficients. In building a BI key to predict the criteria on the total sample, cut-off levels for BI item scoring, and retention in a scoring key, of at least 5% of the sample responding to the item alternative and a correlation between the item alternative and the criterion of a least plus or minus .20 were employed. For a sample of this size (e.g., n=4059), this was an unusually stringent cut-off as it ensured that any item selected would be signficiant far beyond the .01 level of confidence. This significance level was selected in view of previous experience with biographical data as one which would come close to obtaining the desired balance across the item selection parameters. That is, a sufficient number of items would be scored, high item-criterion correlations would be selected which would be highly reliable, and because the number of items selected would be large, some item heterogeneity would also be obtained. While this statistical keying procedure for the analysis of the BI data was satisfactory for the rank in class variable (101 items keyed) and GPA variable (92 items keyed) on the total sample, it resulted in a key of only 46 items being scored for the Family Income Key. Since this was less than a desired number of BI items, the item analysis computer printout was screened by hand and additional items were selected, all of which met statistical significance requirements at the .01 level of confidence or beyond, to lengthen the Family Income Key. As a result of this procedure, 46 additional items were identified which had one or more significant item alternative-criterion correlations (totaling 92 items in the final Family Income Key). The selection of the additional 46 items, although somewhat arbitrary, will permit a description of the most significant life history correlates of family income. These results did indicate that the magnitude of correlations between life history data and family income were somewhat limited, although a large number of statistically significant relationships were obtained. Also, as will be demonstrated in the next section of this report, the family income BI key had substantial cross validities against the family income criterion.

The BI key built on the total sample to predict the binary college attendance variable was based on a similar strategy for similar reasons. The computer generated key for college attendance was also based on a cut-off level of 5% of the sample responding to the item alternative and an item alternative-criterion correlation greater than or equal to .20 in magnitude. The resulting key was based on alternatives contained in only 27 items. Again, the item analysis printout was screened by hand and additional item alternatives were selected which met statistical significance at the .01 level of confidence. The final total sample BI key for the college attendance criterion was based on alternatives contained in 77 items. Again, as will be demonstrated, this key had a meaningful pattern of cross validity coefficients.

The keys built on the large Anglo sample to predict rank in class and GPA were also based on more than 5% of the sample answering an item alternative and an item alternative-criterion correlation greater than or equal to .20 in magnitude. The Anglo rank in class key contained 110 items with keyed alternatives and the Anglo GPA key contained 101 such items.

For the two BI keys constructed to predict GPA on the Black sample and the sample of students in integrated schools, a cut-off level of item alternative-criterion correlations significant beyond the .01 level was used. This was in contrast to the previously discussed cut-off level of at least 5% of the sample responding to the item alternative and an item alternative-criterion correlation greater than or equal to .20 in magnitude. The decision to use this cut-off was due to the smaller sample sizes under consideration (n=885 for Blacks and n=648 for integrated schools on the GPA variable). The computer generated keys resulting from this procedure contained 253 scorable items on the Black sample and 259 scorable items on the integrated sample. In order to prevent the keys from being dominated by extremely small but significant correlations (e.g., for n=885, an eta of .08 or greater is significant at the .01 level) both keys were screened by hand, eliminating those item alternative-criterion correlations deemed too small. The final GPA key for Blacks contained 79 items with keyed alternatives and the final GPA key for students in integrated schools contained 107 items with keyed alternatives.

Following their development, the eight scoring keys were used to score the item responses of all the even numbered cases in order to estimate the predictive effectiveness of the BI on cross validation samples. The reason for this method of analysis was that the use of the same group (the total Black sample for instance) for both the development of the scoring weights and the application of these weights always produces results which are spuriously high and thus fails to give an accurate estimate of the effectiveness of the instrument. Cross validation of the scoring keys on a separate sample provides an estimate of the effectiveness of the procedure on another independent group.

As presented above, all even numbered cases were scored with all of the BI keys. This provided an opportunity to investigate the cross validities of all keys against all criteria on all cross validation samples (explained below), regardless of where the key was constructed. For example, the BI key built on Anglos to predict Anglo-GPA was used to score the total cross validation sample, the Anglo sample, the Black sample, and the sample of students in integrated schools to obtain the cross validity of the Anglo-GPA key against the GPA criterion across the various samples studied.

The samples on which cross validities were determined are presented in Table 3. The first four samples in Table 3 are comparable to those on which the keys were developed. Samples 5 and 6 represent the separate samples of Anglos and Blacks included in the integrated schools sample (sample 4). Separate correlation and cross validity matrices were computed for the Anglo students in integrated schools (Anglo-Integrated) and the Black students in integrated schools (Black-Integrated) sample in order to investigate the similarities and differences between students enrolled in integrated schools versus students enrolled in schools with little or no integration.

Table 3

Samples on Which Correlation Matrices Containing Cross Validity Coefficients Were Computed

Sample Name	n
1. Even Cases from the Total Sample	5524*
2. Even Cases from the Total Anglo Sample	4166
3. Even Cases from the Total Black Sample	888
4. Even Cases of the Students in Five Most Integrated Schools	674*
5. Even Cases of Anglos in Five Most Integrated Schools	530
6. Even Cases of Blacks in Five Most Integrated Schools	129

*Data on race were not available for 470 of the even cases from the total sample including 15 cases in the integrated schools sample.

RESULTS

The results of this study will be presented by means of the correlation and validity matrices computed for each of the major samples presented earlier in Table 3. Correlations and validities for the total cross validation sample, Anglo sample, and Black sample will be presented individually, while the results of the analysis on the total integrated schools sample will be presented in conjunction with the results found on the Anglo students in integrated schools and the Black students in integrated schools. Following the presentation and discussion of the correlation and validation matrices, the biographical correlates of family income will be discussed.

In the presentation of each of the correlation and validity tables, the correlations and validities (with decimals omitted) are included in the lower-left traiangular matrix (the half of the matrix below the diagonal). The upper-right triangular matrix (above the diagonal) includes the sample size (n) for each correlation. Since a number of the variables employed in the present study had varying sample sizes, the matrix of n's was incorporated in the tables so that different significance levels could be ascertained. Means, standard deviations, and sample sizes for each variable are included in either the correlation and validity table or in a separate accompanying table.

Analysis of Total Cross Validation Sample

Means, standard deviations, and sample sizes for each variable included in the total sample analysis are presented in Table 4. The total sample correlation and cross validation matrix is presented in Table 5. Since a one-way cross validation analysis was conducted in the present study, it was appropriate to compare the statistics in Table 5 with the results obtained in the original North Carolina study (IBRIC, 1968), to ascertain if any differences occurred between the cross validation sample (n=5524) in the present study and the original North Carolina cross validation sample (n=11,246). With few exceptions, the results found in Table 5 were comparable with those obtained in the original North Carolina study. For example, race and family income correlated .51 in the original North Carolina study and .50 in the present investigation. The total percentage of Blacks in the original study was 19%, while in the present study this percentage was 18%. In the total North

Table 4

Means, Standard Deviations, and Sample Sizes
for All Variables in the Total Cross Validation Sample

	Variables	Mean	s.d.	n
1.	Race (1=Black, 2=Anglo)	1.82	.38	5054
2.	Family Income	3.03	1.26	4034
3.	Att.Coll. (0=Nc [illegible] es)	.26	.44	2479
4.	Anglo, Coll.Prep. (0=No, 1=Yes)	.39	.49	3652
5.	Black, Coll.Prep. (0=No, 1=Yes)	.19	.39	797
6.	Rank in Class	499.77	100.31	2332
7.	California IQ Test	105.24	15.95	2296
8.	College Board, Verbal Score	445.12	103.02	1131
9.	College Board, Quant. Score	468.65	105.66	1131
10.	College Board, Total Score	913.77	193.23	1131
11.	GPA	21.37	9.06	4849
12.	Likeability	30.32	9.06	5524
13.	IBRIC Creativity Key	102.14	5.95	5524
14.	IBRIC Male GPA Key	101.00	15.79	2635
15.	IBRIC Female GPA Key	99.54	17.86	2889
16.	Grade (1=Ninth, 2=Twelfth)	1.45	.50	5524
17.	Sex (1=Male, 2=Female)	1.52	.50	5524
18.	Age	16.02	1.63	5415
19.	Rank in Class Key-Total Sample	97.72	21.63	5524
20.	GPA Key-Total Sample	103.06	19.81	5524
21.	Rank in Class Key-Anglo Sample	98.57	24.30	5524
22.	GPA Key-Anglo Sample	101.18	21.54	5524
23.	Family Income Key-Total Sample	101.65	22.05	5524
24.	Att.Coll. Key-Total Sample	100.30	19.25	5524
25.	GPA Key-Black Sample	104.54	16.93	5524
26.	GPA Key-Integrated Schools	107.93	20.11	5524

Table 5

Intercorrelations, Cross Validities and Sample Sizes
Total Cross Validation Sample

Variables		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Race (1=Black, 2=Anglo)	1	--	4034	2251	3652	797	2332	2296	1131	1131	1131	4849	5054	5054	2406	2648	5054	5054	4976	5054	5054	5054	5054	5054	5054	5054	5054
Family Income	2	50	--	1607	2802	734	1698	1689	770	770	770	3864	4034	4034	1921	2113	4034	4034	3965	4034	4034	4034	4034	4034	4034	4034	4034
Att. Coll. (0=No, 1=Yes)	3	14	27	--	1767	430	2213	1018	1131	1131	1131	2227	2479	2479	1177	1302	2479	2479	2447	2479	2479	2479	2479	2479	2479	2479	2479
Anglo, Coll.Prep. (0=No, 1=Yes)	4	00	24	30	--	0	1845	1357	968	968	968	3489	3652	3652	1727	1925	3652	3652	3598	3652	3652	3652	3652	3652	3652	3652	3652
Black, Coll.Prep. (0=No, 1=Yes)	5	00	30	25	00	--	434	453	132	132	132	766	797	797	378	419	797	797	793	797	797	797	797	797	797	797	797
Rank in Class	6	04	18	33	48	46	--	1070	1124	1124	1124	2310	2332	2332	1121	1211	2332	2332	2301	2332	2332	2332	2332	2332	2332	2332	2332
Calif. IQ Test	7	44	49	31	32	17	48	--	522	522	522	2283	2296	2296	1093	1203	2296	2296	2261	2296	2296	2296	2296	2296	2296	2296	2296
College Board, Verbal Score	8	39	32	24	25	40	45	64	--	1131	1131	1120	1131	1131	541	590	1131	1131	1117	1131	1131	1131	1131	1131	1131	1131	1131
College Board, Quant. Score	9	42	35	22	24	33	42	64	71	--	1131	1120	1131	1131	541	590	1131	1131	1117	1131	1131	1131	1131	1131	1131	1131	1131
College Board, Total Score	10	44	36	25	26	41	47	69	92	93	--	1120	1131	1131	541	590	1131	1131	1117	1131	1131	1131	1131	1131	1131	1131	1131
GPA	11	15	25	34	27	31	81	46	50	46	52	--	4849	4849	2308	2541	4849	4849	4772	4849	4849	4849	4849	4849	4849	4849	4849
Likeability	12	11	27	31	30	41	70	45	44	39	45	67	--	5524	2635	2889	5524	5524	5415	5524	5524	5524	5524	5524	5524	5524	5524
IBRIC Creativity Key	13	00	20	21	22	16	29	24	48	38	46	23	31	--	2635	2889	5524	5524	5415	5524	5524	5524	5524	5524	5524	5524	5524
IBRIC Male GPA Key	14	02	23	32	31	34	71	39	55	48	55	64	64	59	--	0	2635	2635	2575	2635	2635	2635	2635	2635	2635	2635	2635
IBRIC Female GPA Key	15	03	26	35	35	34	67	39	53	51	56	62	60	58	00	--	2889	2889	2840	2889	2889	2889	2889	2289	2289	2289	2289
Grade (1=Ninth, 2=Twelfth)	16	-04	-16	00	20	18	-03	-01	00	00	00	-19	-06	00	-12	-02	--	5524	5415	5524	5524	5524	5524	5524	5524	5524	5524
Sex (1=Male, 2=Female)	17	00	-03	02	00	04	24	-02	-04	-20	-13	20	09	-17	00	00	00	--	5415	5524	5524	5524	5524	5524	5524	5524	5524
Age	18	-07	-22	-13	11	09	-20	-12	-19	-17	-20	-26	-14	-04	-20	-07	91	-04	--	5415	5415	5415	5415	5415	5415	5415	5415
Rank in Class Key-Total Sample	19	06	31	36	39	44	72	44	48	38	46	65	66	55	89	89	00	19	-09	--	5524	5524	5524	5524	5524	5524	5524
GPA Key-Total Sample	20	08	32	36	38	42	74	45	47	38	45	67	67	51	89	88	-04	19	-13	99	--	5524	5524	5524	5524	5524	5524
Rank in Class Key-Anglo Sample	21	07	33	37	40	43	72	46	51	41	50	65	66	56	89	89	-01	18	-12	99	98	--	5524	5524	5524	5524	5524
GPA Key-Anglo Sample	22	06	30	35	38	42	73	44	45	37	45	66	67	53	90	89	-05	18	-13	99	99	98	--	5524	5524	5524	5524
Family Income Key-Total Sample	23	26	58	40	41	39	52	56	60	52	61	50	54	57	67	69	-07	-01	-17	81	81	83	80	--	5524	5524	5524
Att.Coll. Key-Total Sample	24	15	46	41	44	45	64	51	60	51	60	58	62	62	80	82	00	04	-10	92	91	93	91	93	--	5524	5524
GPA Key-Black Sample	25	06	29	32	35	39	73	42	35	27	33	67	67	43	84	83	-06	26	-15	95	96	94	96	74	86	--	5524
GPA Key-Integrated Schools	26	15	40	40	41	46	73	52	53	44	52	67	68	50	85	86	-03	15	-13	96	97	96	96	85	93	94	--

Carolina sample, 52% of the students were female, and the same was true for the present analysis. The California IQ test mean scores in the previous North Carolina study were: 104.78 (total sample, n=4649), 108.59 (Anglo sample, n=3549), and 92.50 (Black sample, n=1100); while in the present study the means for the same test were: 105.24 (total sample, n=2296), 109.04 (Anglo sample, n=1768), and 92.50 (Black sample, n=528)[6]. Further, the total College Board score correlated .42 (n=2328) with race in the original North Carolina study while the same two measures correlated .44 (n=1131) in the present analysis. Finally, the IBRIC male GPA score correlated .02 (n=4888) with race in the previous study and .02 (n=2406) with race in the present investigation.

The only consistent differences found between the present investigation and the original North Carolina study were the cross validities for the IBRIC male and IBRIC female GPA keys against the GPA and rank in class criteria, which were generally higher in the present study. These results were directly attributable to the data review and revision mentioned previously. Therefore, it was concluded that the cross validation samples used in the present analysis were very similar to those used in the original North Carolina study.

The total sample size (in the present study) was 5524. For those individuals on whom a race variable was available (5054), 4166 were Anglo and 888 were Black. The mean total sample family income for 4034 students was 3.03 (3=$5001.00 to $7000.00)[7]. A total of 26% (n=3479) of the students later attended college, 45% of the students were in the twelfth grade (55% in the ninth grade), and the mean age for the total sample was 16. As presented previously, 52% of the sample were females, and the California IQ test mean was 105.24 (n=2296, s=15.95).

The correlation between race and family income was .50 (Black=1, Anglo=2, n=4034). Race also correlated .14 (n=2251) with attended college, .04 (n=2332) with rank in class, .44 (n=2296) with the California IQ test, .44 (n=1131) with the College Board total score, and .15 with GPA (n=4849). The family income variable demonstrated a similar pattern of relationships as it correlated .27 (n=1607) with attended college, .18 (n=1698) with rank in class, .49 (n=1689) with the California IQ test, .36 (n=770) with the College Board total score and .25 (n=3864) with GPA.

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[6] Standard deviations were also highly similar.

[7] A breakdown for Anglos and Blacks will be presented in discussions of their respective matrices.

It was apparent from the above relationships that the standardized achievement and IQ test scores were related to race and family income. While race and family income demonstrated highly comparable sets of relationships with the achievement test and IQ test data, the fact that the two variables were somewhat different was evidenced initially by their moderately high intercorrelation (.50), and secondly by the higher pattern of correlations found between family income and the attended college, rank in class, and GPA variables.

On the basis of the above discussion, the relationships of race and family income level to each other and the IQ, achievement test, etc., data needs further discussion. For example, the correlations between race and IQ (.44), family income and IQ (.49) and race and family income (.50), indicated that the differences in Anglo and Black IQ's could be largely attributed to the family income measure of socioeconomic status. However, when the effects of family income were partialled out of the correlation between race and IQ, the resulting correlation between race and IQ was still a significant .26.

However, as reviewed in the survey of the literature, a number of measures of socioeconomic level and other variables would have to be controlled before a clear understanding of the relationship between intelligence test level and race could be fully understood.

The rank in class criterion correlated .81 (n=2310) with the GPA criterion in the total sample. The attended college variable correlated .33 (n=2213) with rank in class and .34 (n=2227) with the GPA criterion. A control measure for likeability, i.e., a measure of the degree to which a teacher liked the student he or she was rating, correlated .70 (n=2332) with rank in class and .67 (n=4849) with the GPA criterion. These results indicated that the two academic performance measures, rank in class and GPA, were highly related to desirability as a student[8], yet both academic performance measures predicted college attendance only moderately.

The California IQ test (variable 7) correlated .64 (n=522) with the College Board verbal score, .64 (n=522) with the College Board quantitative score, and .69 (n=522) with the College Board total score. In terms of validities, the California IQ test correlated .48 (n=1070) with rank in class, .46 (n=2283) with GPA, and .31 (n=1018) with attended college. The College Board verbal score and College Board quantative score correlated .92 (n=1131) and .93 (n=1131) respectively with the College Board total score. The College Board total score had validities of .47 (n=1124) against rank in class, .52 (n=1120) against GPA, and .25 (n=1131) against attended college. In summary, the College Board and California IQ tests predicted the academic performance criteria, GPA and class rank, rather successfully with validities ranging in the high .40's and low .50's. Their validities against the attended college variable, however, were in the middle .20's and low .30's.

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[8] For further information concerning the effects of likeability on the teacher assessments, see James, Ellison, McDonald and Taylor (1968).

The IBRIC Creativity Key (variable 13), a BI key adapted for the present sample from highly valid adult scientific and engineering keys, correlated .00 (n=5054) with race, .20 (n=4034) with family income, .29 (n=2332) with rank in class, .23 (n=4849) with GPA, .24 (n=2296) with the California IQ test, and .46 (n=1131) with the College Board total score. Although no relevant criteria for creativity existed in the present analysis (James et al., 1968), some important observations could be made from the above results. Most important was the lack of relationship (.00) between the IBRIC Creativity Key and race. The correlations between the Creativity Key and rank in class and GPA were low, but significant, indicating that creative talents as measured by the BI, were largely dormant as far as official academic achievement measures are concerned.

The low to moderate correlations between the Creativity Key and IQ and the College Board total score (.24 and .46), both of which had moderate correlations with race, indicated that the IBRIC Creativity Key measured in part some form of intellectual orientation and efficiency while not focusing directly upon the verbal intellectual characteristics that are more a function of cultural and educational advantage or deprivation. Finally, the correlation of .20 between the IBRIC Creativity Key and family income indicated a low, but significant, relationship between socioeconomic level and creativity scores, which was partially a function of the college educated scientists and engineers on whom the original key was generated.

The IBRIC male and female GPA biographical keys (variables 14 and 15) provided unusually high cross validities against GPA and rank in class. The IBRIC male GPA key cross validated .71 (n=1121) with rank in class and .64 (n=2308) with GPA; while the IBRIC female GPA key predicted rank in class at the .67 (n=1211) level and GPA at the .62 (n=2541) level. The same two BI keys predicted the attended college criterion at the .32 (n=1177) level for males and the .35 (n=1302) level for females. As previously discussed, the IBRIC male GPA key correlated .02 with race and the IBRIC female GPA key correlated .03 with race. To summarize, the IBRIC GPA keys had substantial cross validities with the academic performance criteria; however, their cross validities for attended college were only moderate. Equally important, the IBRIC GPA keys had essentially zero correlations with race, and yet were highly valid predictors of academic success. The IBRIC GPA keys did correlate significantly with family income (males=.23, females=.26). However, as discussed previously, and elaborated later in this report, the family income criterion included variance not in common with race but in common with academic performance.

The biographical keys developed specifically for the present study, variables 19 through 26 in Tables 4 and 5, predicted the rank in class and GPA criteria at levels slightly higher than the original IBRIC GPA keys. For example, the total sample GPA key, Black-GPA key and integrated GPA key all correlated .67 (n's=4849) with the GPA criterion and the total sample GPA key correlated .74 (n=2332) with the rank in class criterion. An interesting phenomenon found in predicting the academic performance criteria was the very high degree of similarity of the cross validities of the BI keys developed to predict the academic performance criteria (all keys except variables 23 and 24) regardless of the samples on which the keys were developed.

For example, BI keys 19-22 and 25-26 all predicted the rank in class criterion with cross validities ranging from .72 to .74. These results pointed to the extremely high and quite equal predictive efficiencies of BI keys built on the total sample, Anglos only, or Blacks only, when used to score the combined Anglo-Black sample. In other words, the predictive efficiency of a BI key was independent of the sample it was constructed on when cross validities were determined for the total sample. However, differences between the predictabilities of Anglos and Blacks were found, and will be presented in their appropriate sections. Also, the increases in validity for the new BI keys in comparison to the original IBRIC GPA keys will be more fully discussed in later sections of this report.

The BI key developed to predict family income, variable 23, correlated .58 (n=4034) with the family income criterion. This key was constructed on the total sample, and represented a highly significant degree of prediction. On the basis of this predictive efficiency and in view of the socioeconomic implications of family income, the discussion later in this report of the biographical correlates of family income will be certainly reliable and hopefully informative.

Since the family income criterion correlated .50 with race, it could be expected that the BI key constructed to predict this criterion would also correlate highly with race. However, the family income BI key correlated only .26 with race, which suggested that biographical correlates of family income only somewhat reflected differences in racial heritage. Stated in other words, if race and the family income BI key were combined in a regression equation to predict family income, the multiple R would be substantial as race and the BI key were relatively independent correlates of family income.

Another important characteristic of the family income key (variable 23) was its very high correlation with the College Board scores. This BI key correlated .61 with the total College Board score, which was substantially higher than any other BI key included in the study with the exception of the BI key constructed to predict college attendance, which was .60. Since the family income criterion correlated only .36 with the College Board total score, these results suggested that the attitudes and life history correlates of family income, when scored in a cummulative manner as in a BI key, were highly associated with intellectual competence as defined by the College Board scores; much more highly associated than the family income measure itself. A similar statement can be made for rank in class or GPA, i.e., the cummulative correlates of family income were more highly associated with performance on the College Board than were rank in class and GPA measures of academic performance which the College Board scores were designed to predict. Rank in class and GPA correlated .47 and .52, respectively, with the College Board total score.

These results, in conjunction with the parallel pattern of correlations of the attend college BI key, suggested the family income and the attended college BI keys, in part, measured an intellectual achievement orientation which was not as strongly associated with race, or school grades, as they were with an intellectual aptitude test such as the College Board.

It was interesting that the BI key with next highest cross validity against the family income criterion was the key constructed to predict attendance at college (variable 24, r=.46, n=4034). Since the attended college criterion only correlated .14 with race, but .27 with the family income variable, the correlation between the attended college BI key and family income reflected again the difference in variance between family income and race. This was further evidenced by the fact that the attended college key correlated only .15 (n=5054) with race.

The BI key constructed to predict the attended college criterion, variable 24, cross validated .41 (n=2479) against this criterion. The family income BI key, variable 23, correlated .40 (n=2479) with this college attendance criterion, as did the integrated GPA key (n=2479). These correlations were more substantial than any other validities obtained against the attended college criterion, including those of the GPA criterion, the rank in class criterion, either of the Anglo-college preparatory or Black-college preparatory variables, or the achievement or IQ tests.

The new BI keys developed specifically for this study to predict academic performance for the Anglo sample, variables 21 and 22, correlated .07 (n=5054) and .06 (n=5054) with race when the two keys were used to score both Anglos and Blacks in the total sample. The BI key developed specifically on Blacks to predict Black-GPA correlated .06 (n=5054) with race when the key was employed to score the total sample. The BI key developed to predict family income correlated .26 (n=5054) with race, reflecting the .50 correlation between race and family income. The BI key constructed to predict GPA in integrated schools, variable 26, correlated .15 (n=5054) with race when applied to the total sample. Since this key was constructed to reflect any racial differences in GPA in the integrated sample, the .15 was expected.

The new BI keys oriented toward academic performance in school, keys 19-22 and 25-26, had correlations ranging from -.01 to -.06 (n=5524) with ninth versus twelfth grade in school, variable 16. These same BI keys also correlated between .15 and .26 with sex (n=5524), demonstrating somewhat higher scores for females, and from -.09 to -.15 with age. This was not surprising in that the GPA criteria correlated -.19 (n=4849) with grade in school, .20 (n=4849) with sex, and -.26 (n=4772) with age. Therefore, if the new academic keys were to be valid, which they were, then they would be expected to demonstrate relationships as comparable with the control variables of grade, sex, and age as the criteria they were developed to predict.

In summary, the new BI keys constructed to predict rank in class and GPA on the total, Anglo, and Black samples were substantially more valid against these academic criteria than were either the California IQ test or the College Board scores. In addition, these BI keys also had substantially lower correlations with race. While IQ and the College Board total score both correlated .44 with race, the above academic performance keys only correlated between .06 and .08 with race. Although these correlations between the academically oriented BI keys and race did reflect a small but significant mean difference between Anglo and Black means on the BI keys, less than 01% of the variance in the BI keys could be accounted for by race[9]. The more substantial predictive efficiency of the BI was further evidenced by the validity of the attended college BI key against the attended college criterion (.41). This was the highest validity obtained for the attended college criterion. The validity of the family income BI key against the family income criterion (.58) forecasted a high reliability of the discussion of the biographical correlates of family income to be presented later in this report. Finally, the new BI keys evidenced generally the same patterns of relationships with the grade, sex, and age variables as the criteria they were developed to predict.

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[9] The means on the BI keys for the Anglo and Black samples will be presented later in this report.

Analysis of the Anglo Sample

The means, standard deviations, and sample sizes for each variable included in the analysis of the total Anglo sample are presented in Table 6. The correlation and validation matrix for the Anglo sample (n=4166) is presented in Table 7. The mean family income for this sample was 3.35 (n=3216), which represented approximately $5,700.00. As in the total sample, 52% of the Anglo sample were females, 44% of the students were in the twelfth grade and the mean age was again 16. The mean California IQ test score was 109.04 (n=1768, s=14.25) and 31% of the students later attended college (for data available on 1814 twelfth grade students). The Anglo sample was quite similar to the total sample; however, mean differences were apparent for family income, IQ, etc. These differences were largely attributable to race, and will be discussed in the presentation of the analysis of the Black sample.

The family income variable correlated .24 (n=1215) with attended college in the Anglo sample, .19 (n=1300) with rank in class, .31 (n=1204) with the California IQ test, .23 (n=650) with the College Board total score, and .20 (n=3078) with GPA. These correlations were lower than the correlations found between family income and the academic performance, IQ and achievement variables in the total sample. This was most likely due to the deletion of the effects of race in the Anglo sample. However, the correlations between family income and the academic performance, IQ, and achievement variables were still significant in the total Anglo sample, indicating again that only a portion of the variance in family income was overlapped by race.

The rank in class variable correlated .83 (n=1882) with the GPA criterion, .34 (n=1786) with attended college, and .48 (n=1845) with Anglo-college preparatory. The GPA criterion correlated .34 (n=1805) with attended college and .27 (n=3489) with Anglo-college preparatory. Attended college and Anglo-college preparatory correlated .30 (n=1767). The likeability control measure correlated .70 (n=1891) with rank in class and .68 (n=3995) with GPA. These results were very similar to those obtained for the total sample where the rank in class and GPA criteria correlated substantially with desirability as a student, but correlated only moderately with the attended college variable. It was also interesting that the GPA criterion had only a moderate

Table 6

Means, Standard Deviations, and Sample Sizes
for All Variables in the Anglo Cross Validation Sample

Variables	Mean	s.d.	n
1. Race			4166
2. Family Income	3.35	1.14	3216
3. Att.Coll. (0=No, 1=Yes)	.31	.46	1814
4. Anglo, Coll.Prep. (0=No, 1=Yes)	.39	.49	3652
5. Black, Coll.Prep. (0=No, 1=Yes)	.00	.00	0
6. Rank in Class	501.63	101.07	1891
7. California IQ Test	109.04	14.25	1768
8. College Board, Verbal Score	459.85	96.90	997
9. College Board, Quant. Score	484.77	99.05	997
10. College Board, Total Score	944.62	78.84	997
11. GPA	21.98	9.15	3995
12. Likeability	30.78	9.04	4166
13. IBRIC Creativity Key	102.20	6.12	4166
14. IBRIC Male GPA Key	101.04	16.51	1978
15. IBRIC Female GPA Key	99.89	18.60	2188
16. Grade (1=Ninth, 2=Twelfth)	1.44	.50	4166
17. Sex (1=Male, 2=Female)	1.52	.50	4166
18. Age	15.94	1.61	4097
19. Rank in Class Key-Total Sample	98.40	22.16	4166
20. GPA Key-Total Sample	103.87	20.22	4166
21. Rank in Class Key-Anglo Sample	99.50	25.00	4166
22. GPA Key-Anglo Sample	101.83	22.08	4166
23. Family Income Key-Total Sample	104.58	22.04	4166
24. Att.Coll. Key-Total Sample	101.81	19.67	4166
25. GPA Key-Black Sample	105.04	16.94	4166
26. GPA Key-Integrated Schools	109.43	20.30	4166

Table 7

Intercorrelations, Cross Validities and Sample Sizes
Anglo Cross Validation Sample

Variables		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		17	18	19	20	21	22	23	24	25	26
Race	1	--	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-
Family Income	2	-	--	1215	2802	-	1300	1204	650	650	650	3078	3216	3216	1533	1683	3216	3216	3155	3216	3216	3216	3216	3216	3216	3216	3216
Att.Coll. (0=No, 1=Yes)	3	-	24	--	1767	-	1786	835	997	997	997	1805	1814	1814	870	944	1814	1814	1788	1814	1814	1814	1814	1814	1814	1814	1814
Anglo, Coll.Prep. (0=No, 1=Yes)	4	-	24	30	--	-	1845	1357	968	968	968	3489	3652	3652	1727	1925	3652	3652	3598	3652	3652	3652	3652	3652	3652	3652	3652
Black, Coll.Prep. (0=No, 1=Yes)	5	-	-	-	-	--	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rank in Class	6	-	19	34	48	-	--	880	992	992	992	1882	1891	1891	912	979	1891	1891	1864	1891	1891	1891	1891	1891	1891	1891	1891
California IQ Test	7	-	31	31	32	-	51	--	476	476	476	1761	1768	1768	840	928	1768	1768	1741	1768	1768	1768	1768	1768	1768	1768	1768
College Board, Verbal Score	8	-	20	23	25	-	52	59	--	997	997	993	997	997	485	512	997	997	984	997	997	997	997	997	997	997	997
College Board, Quant. Score	9	-	22	21	24	-	49	59	67	--	997	993	997	997	485	512	997	997	984	997	997	997	997	997	997	997	997
College Board, Total Score	10	-	23	24	26	-	55	65	91	91	--	993	997	997	485	512	997	997	984	997	997	997	997	997	997	997	997
GPA	11	-	20	34	27	-	83	47	53	49	56	--	3995	3995	1896	2099	3995	3995	3927	3995	3995	3955	3955	3955	3955	3955	3955
Likeability	12	-	25	35	30	-	70	44	50	47	53	68	--	4166	1978	2188	4166	4166	4097	4166	4166	4166	4166	4166	4166	4166	4166
IBRIC Creativity Key	13	-	25	22	22	-	30	33	50	39	48	25	35	--	1978	2188	4166	4166	4097	4166	4166	4166	4166	4166	4166	4166	4166
IBRIC Male GPA Key	14	-	26	36	31	-	74	48	61	57	64	68	68	59	--	0	1978	1978	1943	1978	1978	1978	1978	1978	1978	1978	1978
IBRIC Female GPA Key	15	-	29	38	35	-	69	44	60	56	64	64	62	58	00	--	2188	2188	2154	2188	2188	2188	2188	2188	2188	2188	2188
Grade (1=Ninth, 2=Twelfth)	16	-	-15	00	20	-	-04	-06	00	00	00	-19	-11	00	-15	-03	--	4166	4097	4166	4166	4166	4166	4166	4166	4166	4166
Sex (1=Male, 2=Female)	17	-	-04	03	00	-	24	-03	00	-20	-12	20	08	-17	00	00	00	--	4097	4166	4166	4166	4166	4166	4166	4166	4166
Age	18	-	-21	-14	11	-	-23	-17	-16	-15	-17	-25	-18	-04	-24	-07	92	-05	--	4097	4097	4097	4097	4097	4097	4097	4097
Rank in Class Key-Total Sample	19	-	33	39	39	-	75	48	55	44	54	67	67	56	90	89	-02	18	-11	--	4166	4166	4166	4166	4166	4166	4166
GPA key-Total Sample	20	-	33	39	38	-	76	49	53	43	53	69	68	53	90	89	-06	18	-15	99	--	4166	4166	4166	4166	4166	4166
Rank in Class Key-Anglo Sample	21	-	34	40	40	-	74	50	56	46	56	66	67	57	90	90	-02	17	-13	99	98	--	4166	4166	4166	4166	4166
GPA Key-Anglo Sample	22	-	32	38	38	-	75	48	53	44	53	68	68	54	91	89	-07	17	-16	99	100	99	--	4166	4166	4166	4166
Family Income Key-Total Sample	23	-	54	39	41	-	54	54	56	47	56	49	54	60	70	72	-05	-01	-14	83	82	84	82	--	4166	4166	4166
Att. Coll. Key-Total Sample	24	-	46	42	44	-	66	53	63	52	63	58	62	64	81	82	00	03	-10	93	92	94	92	94	--	4166	4166
GPA Key-Black Sample	25	-	30	36	35	-	75	45	43	35	43	68	67	45	86	85	-09	24	-17	95	97	94	96	76	86	--	4166
GPA Key-Integrated Schools	26	-	38	41	41	-	75	53	57	48	57	68	69	52	87	88	-04	14	-13	96	97	96	97	86	93	94	--

relationship with the college preparatory variable, and further, the .30 correlation between Anglo-college preparatory and attended college was surprisingly low in comparison to what one might expect.

For the Anglo sample, the California IQ test correlated .65 (n=476) with the College Board total score and .59 (n=476) with each of the separate parts of the College Board. The California IQ test had validities of .51 (n=880) against the rank in class criterion, .47 (n=1768) against the GPA criterion, and .31 (n=835) against attended college. The College Board total score had validities of .55 (n=992) with rank in class, .56 (n=993) with GPA, and .24 (n=997) with attended college. It was apparent from these results that the California IQ test and College Board were both efficient predictors of academic performance (as measured by class rank and GPA), but were not as predictive of the attended college variable.

The previously constructed IBRIC male GPA key predicted rank in class at the .74 (n=912) level and GPA at the .68 (n=1896) level. This same BI key had a cross validity of .36 (n=870) against attended college. The IBRIC female GPA key had cross validities of .69 (n=979) with rank in class, .64 (n=2099) with GPA, and .38 (n=944) with attended college. It was therefore evident that the BI keys constructed previously were noteably more significant predictors of acadmic performance than IQ or the College Board, but not of whether a student attended college.

Both of the IBRIC GPA key scores correlated .64 with College Board total scores, which approximated the correlation of the California IQ score with the College Board score (.65). These were very high relationships for non-intellectual measures as they essentially were parallel to the relationships among the intellectual measure themselves. The other key scores also had generally high correlations with the College Board scores.

The new BI keys constructed in this study to predict the rank in class and GPA criteria also had very high cross validities against the rank in class and GPA criteria. The BI key constructed to predict GPA on the total sample, variable 20, had a cross validity of .76 (n=1891) against rank in class, while four new BI keys, variables 19, 22, 25 and 26, had cross validities of .75 (n=1891) against this same criterion. The key constructed specifically to predict Anglo-rank in class, variable 21, had a cross-validity of .74 (n=1891) against the class rank criterion. The total sample GPA key also had the highest cross validity against the GPA criterion for the Anglo sample, which was .69 (n=3955). Three other new BI keys, variables 22, 25, and 26, had cross validities of .68 (n=3955) against the GPA criterion. Variable 22, the Anglo-GPA key, was one of these predictors.

Three important observations could be made from the above results. First, the new BI keys developed in this study to predict rank in class and GPA were considerably more valid than the California IQ test and College Board scores against these academic performance criteria. Secondly, variable 25 -- the new BI key developed to predict GPA on Blacks only, was essentially just as valid against the academic performance criteria as the Anglo or total sample BI keys when this key was applied to Anglos. In other words, the Black GPA key was just as valid as the Anglo or total sample GPA or rank in class BI keys on the Anglo sample only. The third observation was that the new BI keys developed for the Anglo sample to predict rank in class and GPA were not more valid against these academic criteria than were the original IBRIC keys. This was somewhat expected because the IBRIC GPA keys were developed on a predominantly Anglo sample. Nevertheless, since the IBRIC GPA keys were constructed on a college sample, the investigators hoped to increase prediction by constructing BI keys on the present high school sample. Evidently, the answering pattern to BI items were only slightly affected by the different ages and geographic differences in the two Anglo samples. However, as will be reported later, higher validities were found for the Black sample.

The new BI key constructed to predict family income on the total sample, variable 23, had a cross validity of .54 (n=3216) against the family income criterion in the Anglo sample. This was the highest correlation or validity received for the family income variable in the analysis of the Anglo sample. The attended college BI key, variable 24, predicted the attended college criterion at the .42 (n=1814) level in the Anglo sample. This was also the highest correlation or validity received for this criterion, again reflecting the superior predictive efficiency of a BI in comparison to the other predictors included in this study.

Analysis of the Black Sample

The means, standard deviations and sample sizes for each variable included in the analysis of the total Black sample are presented in Table 8. The correlation and validation matrix for the Black sample is presented in Table 9. The total number of students in the Black sample was 888. The mean family income for this sample was 1.79 (n=818), which represented an average income of less than $3,000.00. This was significantly lower than the Anglo family income level, as reflected by the .50 total sample correlation between race and family income level. The Black sample had some similarities to the Anglo sample as 52% of the Black sample were females (Anglo=52% female), 49% of the sample were in the twelfth grade (Anglo=43% twelfth grade) and the mean age was 16 (Anglo=16 years). The similarities between the two samples, however, ended with these variables.

Table 8

Means, Standard Deviations, and Sample Sizes
for All Variables in the Black Cross Validation Sample

Variables	Mean	s.d.	n
1. Race			888
2. Family Income	1.79	.90	818
3. Att. Coll. (0=No, 1=Yes)	.15	.36	437
4. Anglo, Coll. Prep. (0=No, 1=Yes)	.00	.00	0
5. Black, Coll. Prep. (0=No, 1=Yes)	.19	.39	797
6. Rank in Class	491.83	96.72	441
7. California IQ Test	92.50	14.70	528
8. College Board,Verbal Score	335.52	78.36	134
9. College Board, Quant. Score	348.70	70.28	134
10. College Board, Total Score	684.22	132.29	134
11. GPA	18.53	8.04	854
12. Likeability	28.12	8.48	888
13. IBRIC Creativity Key	102.22	5.12	888
14. IBRIC Male GPA Key	100.09	12.30	428
15. IBRIC Female GPA Key	98.40	14.34	460
16. Grade (1=Ninth, 2=Twelfth)	1.49	.50	888
17. Sex (1=Male, 2=Female)	1.52	.50	888
18. Age	16.25	1.74	879
19. Rank in Class Key-Total Sample	94.76	18.96	888
20. GPA Key-Total Sample	99.50	17.64	888
21. Rank in Class Key-Anglo Sample	94.70	20.76	888
22. GPA Key-Anglo Sample	98.36	18.92	888
23. Family Income Key-Total Sample	89.47	17.87	888
24. Att. Coll. Key-Total Sample	94.15	16.18	888
25. GPA Key-Black Sample	102.22	16.47	888
26. GPA Key-Integrated Schools	101.32	17.98	888

Table 9

Intercorrelations, Cross Validities and Sample Sizes
Black Cross Validation Sample

Variables		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Race	1	--	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Family Income	2	-	--	392	-	734	398	485	120	120	120	786	818	818	388	430	818	818	810	818	818	818	818	818	818	818	818
Att. Coll. (0=No, 1=Yes)	3	-	18	--	-	430	427	183	134	134	134	422	437	437	206	231	437	437	433	437	437	437	437	437	437	437	437
Anglo, Coll. Prep. (0=No, 1=Yes)	4	-	-	-	--	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Black, Coll.Prep. (0=No, 1=Yes)	5	-	30	25	-	--	434	453	132	132	132	766	797	797	378	419	797	797	793	797	797	797	797	797	797	797	797
Rank in Class	6	-	16	24	-	46	--	190	132	132	132	428	441	441	209	232	441	441	437	441	441	441	441	441	441	441	441
Calif. IQ Test	7	-	20	09	-	17	39	--	46	46	46	522	528	528	253	275	528	528	520	528	528	528	528	528	528	528	528
College Board, Verbal Score	8	-	13	11	-	40	45	14	--	134	134	127	134	134	56	78	13.	134	133	134	134	134	134	134	134	134	134
College Board, Quant. Score	9	-	09	11	-	33	38	11	58	--	134	127	134	134	56	78	134	134	133	134	134	134	134	134	134	134	134
College Board, Total Score	10	-	12	12	-	41	47	15	90	88	--	127	134	134	56	78	134	134	133	134	134	134	134	134	134	134	134
GPA	11	-	25	21	-	31	74	43	35	25	34	--	854	854	412	442	854	854	845	854	854	854	854	854	854	854	854
Likeability	12	-	23	20	-	41	68	38	51	33	47	61	--	888	428	460	888	888	879	888	888	888	888	888	888	888	888
IBRIC Creativity Key	13	-	12	14	-	16	21	08	52	42	53	11	17	--	428	460	888	888	879	888	888	888	888	888	888	888	888
IBRIC Male GPA Key	14	-	18	23	-	34	53	08	66	45	62	45	46	56	--	0	428	428	422	428	428	428	428	428	428	428	428
IBRIC Female GPA Key	15	-	22	24	-	34	56	31	36	45	47	52	53	52	00	--	460	460	457	460	460	460	460	460	460	460	460
Grade (1=Ninth, 2=Twelfth)	16	-	-08	00	-	18	05	-08	00	00	00	-19	15	-06	02	-02	--	888	879	888	888	888	888	888	888	888	888
Sex (1=Male, 2=Female)	17	-	00	04	-	04	25	00	-16	-16	-18	25	20	-16	00	00	02	--	888	888	888	888	888	888	888	888	888
Age	18	-	-14	-08	-	09	-10	-17	-20	-06	-15	-25	06	-08	-02	-07	91	-03	--	879	879	879	879	879	879	879	879
Rank in Class Key-Total Sample	19	-	25	29	-	44	61	31	42	36	44	53	60	47	85	84	09	23	00	--	888	888	888	888	888	888	888
GPA Key-Total Sample	20	-	26	29	-	42	63	31	39	33	41	55	61	44	84	84	06	23	-02	98	--	888	888	888	888	888	888
Rank in Class Key-Anglo Sample	21	-	26	30	-	43	60	32	43	37	45	53	59	50	85	86	05	21	-04	99	98	--	888	888	888	888	888
GPA Key-Anglo Sample	22	-	24	29	-	42	62	31	37	32	39	54	60	46	85	84	07	22	00	98	99	98	--	888	888	888	888
Family Income Key-Total Sample	23	-	42	31	-	39	43	34	50	42	51	43	47	54	63	64	-10	00	-19	78	78	80	77	--	888	888	888
Att. Coll. Key-Total Sample	24	-	35	32	-	45	55	32	49	40	51	49	56	55	75	77	02	06	-05	92	91	92	91	91	--	888	888
GPA Key-Black Sample	25	-	26	30	-	39	65	33	30	29	33	60	64	33	76	78	05	31	-04	93	95	92	94	71	84	--	888
GPA Key-Integrated Schools	26	-	34	34	-	46	64	37	46	39	48	58	64	41	78	80	06	19	-04	95	96	94	95	82	92	94	--

The mean California IQ test score was 92.50 (n=528, s=14.70) for the Black sample. The highly significant mean difference between Black and Anglo (mean=109.04, s=14.25) IQ's was reflected by the .44 correlation obtained in the total sample between race and California IQ. Only 15% of the Black sample later attended college, based on data received from 437 cases. This percentage was approximately one-half of the percentage of Anglo students who later attended college. Furthermore, highly significant differences also occurred between Black and Anglo means on the College Board scores. The mean Black total College Board score was 684.22 (n=134, s=132.29) versus an Anglo mean of 944.62 (n=997, s=78.84). These differences in IQ scores and achievement measures, as previously illustrated by the total sample correlations between race and the IQ and achievement test data, need to be interpreted in conjunction with other data, and only one such measure is available in this study -- the family income variable.

For the Black sample, family income correlated .18 (n=392) with attended college, .16 (n=398) with rank in class, .20 (n=485) with the California IQ test, .12 (n=120) with the College Board total score, and .25 (n=786) with the GPA criterion. With the exception of GPA, all these correlations were lower in the Black sample than in the Anglo sample. This in part may have been due to somewhat lower variability (i.e., more homogeneity) in either one or both of the above variables correlated for the Black sample. For example, the standard deviation for family income was .90 in the Black sample and 1.14 in the Anglo sample. However, with the exception of the family income - College Board correlation, all correlations were significant, although little variance was accounted for, which again reflected some differences in variance encompassed by the family income and race variables.

The rank in class criterion correlated .74 (n=428) with the GPA criterion, .24 (n=427) with attended college, and .46 (n=434) with Black-college preparatory. The GPA criterion correlated .21 (n=422) with attended college and .31 (n=766) with Black-college preparatory. Attended college and Black-college preparatory correlated .25 (n=430). The likeability control measure correlated .68 (n=441) with rank in class and .61 (n=854) with GPA. These results were in most cases similar to the correlations obtained between the same variables in the Anglo and total samples although the correlations tended to be of somewhat smaller magnitudes for the Black sample. The rank in class and GPA criteria were highly related to teacher assessments of likeability, and neither variable was substantially related to attended college. Both of these academic performance measures correlated at levels similar to their counterparts in the Anglo sample with Black-college preparatory. In fact, the .46 correlation between rank in class and Black-college preparatory was what would be expected because more of the academically talented students would be assumed to be in college preparatory programs. It was interesting, therefore, to find the rather low correlation between Black-college preparatory and attended college (.25).

The California IQ test correlated .39 (n=190) with rank in class, .43 (n=522) with GPA and .09 (n=183) with attended college. The College Board total score had validities of .47 (n=132) against rank in class, .34 (n=127) against GPA and .12 (n=134) against attended college. These validities were, without exception, lower than the validities received between the same variables in the analysis of the Anglo sample. This in part may have been due to less variability in the Black sample. The standard deviations for the data on the Black sample were generally lower than the standard deviations for Anglos. For example, rank in class had a standard deviation of 9.15 for Anglos and 8.04 for Blacks. However, both the California IQ test and College Board total score had larger standard deviations in the Black sample. Therefore, the effects of less variability could be attributed only to the criteria, i.e., rank, GPA, and attended college, for the College Board total score validities. The same would be true for the California IQ test. In addition to the above, further effects of lower variability could have occurred because the number of cases upon which the correlations between the criteria and IQ were calculated were approximately a third or less than the total number of Black students having the IQ score.

The IBRIC male GPA key had cross validities of .53 (n=209) against rank in class, .45 (n=412) against the GPA criterion, and .23 (n=206) against attended college in the Black sample. The IBRIC female GPA key had cross validities of .56 (n=232) against rank in class, .52 (n=442) against GPA, and .24 (n=231) against attended college. These cross validities for the IBRIC GPA keys were without exception higher than the validities received for the IQ and College Board total score, although these differences were not as large in the Black sample as they were in the Anglo sample. The IBRIC GPA keys, while having cross validities generally in the .50's against the academic performance criteria in the Black sample, were notably less valid for the Black sample than for the Anglo sample. This was partially due to less heterogeneity in both the BI keys and the academic performance criteria as Blacks had lower standard deviations on both of these variables. The lower variability in the IBRIC GPA keys (for the Black sample) was most likely due to the fact that these two keys were constructed on a predominantly Anglo sample and therefore did not provide maximum differentiation within the Black sample.

The new BI key developed in this study to predict Black GPA, variable 25, had cross validities of .65 (n=441) against rank in class and .60 (n=854) against the GPA criterion in the Black sample. The next most valid new BI key against these two academic performance criteria was the integrated GPA key, which had cross validities of .64 (n=441) and .58 (n=854) against rank and GPA, respectively, when applied to the Black sample. The remaining new BI keys constructed to predict either rank in class or GPA on the Anglo sample or total sample had cross validities ranging from .60 to .63 (n's=441) for rank and from .53 to .55 (n's=854) for GPA when these keys were employed on Blacks only.

A number of important observations can be made on the basis of the above data. First, for the Black sample, the new BI keys were substantially more valid against the academic performance criteria, i.e., rank in class and GPA, than either the California IQ test or College Board scores. Some, but not all, of these differences may have been attributed to the somewhat more severe effects of lower variability for the IQ and College Board validities.

Secondly, and of major importance, was the fact that the Black-GPA key was notably more valid than the IBRIC GPA keys against the rank in class criterion and the GPA criterion in the Black sample. The GPA key constructed on Blacks only had cross validities of .65 and .60 against the rank and GPA criteria, respectively, while the average cross validities for the IBRIC male and female GPA keys were .54 against rank in class and .50 against GPA. Thus, the Black-GPA key had cross validities approximately 10 hundredths (.10) higher than the IBRIC GPA keys. These results supported the hypothesis underlying Objective 1 in this study in that the need to explore the biographical correlates of a Black only sample existed if increased prediction for Blacks was to be achieved.

A third observation centered around the fact that Black academic performance was still not as predictable as academic performance for Anglos, although the extent of this difference in prediction was greatly reduced in the present study. For example, in the previous North Carolina study, where the BI keys employed were developed on a predominantly Anglo sample, the Anglo rank and GPA criteria were generally predicted in the high .60's and low .70's (as reflected by the validities of the IBRIC GPA keys in the present analysis). The Black rank and GPA criteria were predicted in the high .40's and low .50's, representing a 20 hundredths (.20) lower prediction for Blacks in comparison to Anglos.

In the present study, however, while the Anglo validities generally remained the same, a BI key built to predict GPA for Blacks increased the prediction of rank in class and GPA for Blacks approximately 10 hundredths (.65 and .60 respectively). Therefore, on the basis of the present study, Black academic performance was more predictable and the difference in validities for the academic performance criteria between Blacks and Anglos was reduced by about one-half.

The remaining difference between the predictabilities of Anglos and Blacks could partially be attributed to less variability in both BI keys and criteria for all variables except the Black-GPA key. The Black-GPA key was the only new BI key developed on Blacks exclusively, and had approximately the same standard deviation when applied to Blacks as when applied to Anglos. This was not true for any of the other new or previously constructed BI keys, all of which had Anglos included in their composition. The fact that some effects of less variability were still inherent in the Black rank in class and GPA criteria, however, may have had an effect in somewhat attenuating the possible validities of the Black-GPA key on Blacks. The effects of lower variability in the criteria in the Black sample were especially apparent when the validities of the Black-GPA key were compared for Anglos and Blacks. For the Anglo sample all new BI rank and GPA keys were very similar in their predictive effectiveness against the rank and GPA criteria. However, although all new BI keys were predictive at relatively high levels for Blacks, patterns of cross validities as "close-knit" as those received for Anglos were not as apparent.

The new BI key constructed to predict family income on the total sample, variable 23, had a cross validity of .42 (n=818) against the family income criterion in the Black sample. As in the case of the Anglo sample, this was the highest correlation or validity obtained for the family income criterion. Narrowed range in the family income criterion and BI key was most likely present in that Black family income was 11 hundredths less predictable than Anglo. However, the .42 cross validity for Blacks was still highly significant. The total sample BI key for attended college, variable 24, had a cross validity of .32 (n=437) against attended college in the Black sample. The integrated GPA key, however, had a cross validity of .34 (n=437) against this same criterion. These two cross validities were the highest correlations obtained for the attended college variable, higher than correlations between attended college and rank in class or GPA. Nevertheless, Black-attended college was less predictable than Anglo-attended college, again a reflection of lower variability in the criterion.

Analysis of Integrated Schools

The total integrated sample matrix is presented in Table 10. Correlation and validation matrices for Anglos in integrated schools and Blacks in integrated schools are presented in Tables 11 and 12. The presentation of the analysis of integrated schools will be focused upon the integrated schools matrix, Table 10, and pertinent information from the two separate Anglo and Black integrated schools matrices, Tables 11 and 12, will be included in that presentation. References will also be made to the previously discussed results.

Table 10

Intercorrelations, Cross Validities, Means,
Standard Deviations, and Sample Sizes
Integrated Schools Cross Validation Sample

Variables		1	2	3	4	5	6	7	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	Mean	s.d.	n
Race (1=Black, 2=Anglo)	1	--	579	152	245	62	149	423	649	659	659	328	331	659	659	649	659	659	659	659	659	659	659	659	1.80	.40	659
Family Income	2	56	--	75	187	45	74	364	572	579	579	283	296	579	579	569	579	579	579	579	579	579	579	579	3.11	1.19	579
Attended College (0=No, 1=Yes)	3	16	02	--	118	29	149	114	150	155	155	69	86	155	155	154	155	155	155	155	155	155	155	155	.29	.46	155
Anglo, Coll.Prep. (0=No, 1=Yes)	4	00	22	43	--	0	118	94	240	245	245	112	133	245	245	245	245	245	245	245	245	245	245	245	.58	.49	245
Black, Coll.Prep. (0=No, 1=Yes)	5	00	47	29	00	--	26	16	60	62	62	33	29	62	62	62	62	62	62	62	62	62	62	62	.19	.40	62
Rank in Class	6	23	25	43	62	-07	--	112	149	149	149	67	82	149	149	149	149	149	149	149	149	149	149	149	500.33	104.20	149
California IQ Test	7	45	51	32	48	00	59	--	420	423	423	218	205	423	423	414	423	423	423	423	423	423	423	423	106.04	15.06	423
GPA	11	26	42	50	55	46	89	60	--	649	649	322	327	649	649	639	649	649	649	649	649	649	649	649	21.91	9.08	649
Likeability	12	29	43	44	54	55	64	54	72	--	674	336	338	674	674	663	674	674	674	674	674	674	674	674	29.46	9.95	674
IBRIC Creativity Key	13	04	20	18	30	12	22	25	26	37	--	336	338	674	674	663	674	674	674	674	674	674	674	674	102.44	5.71	674
IBRIC Male GPA Key	14	13	29	48	55	34	72	48	69	68	64	--	0	336	336	328	336	336	336	336	336	336	336	336	102.80	16.55	336
IBRIC Female GPA Key	15	04	31	46	50	46	69	40	65	63	61	00	--	338	338	335	338	338	338	338	338	338	338	338	101.05	18.23	338
Grade (1=Ninth, 2=Twelfth)	16	00	-07	00	-03	-30	00	-05	-12	-04	-05	-10	-01	--	674	663	674	674	674	674	674	674	674	674	1.23	.42	674
Sex (1=Male, 2=Female)	17	04	02	09	-01	03	28	00	22	10	-18	00	00	06	--	663	674	674	674	674	674	674	674	674	1.50	.50	674
Age	18	-02	-13	-02	-16	-38	-21	-12	-20	-12	-07	-18	-06	87	00	--	663	663	663	663	663	663	663	663	15.39	1.37	663
Rank in Class Key-Total Sample	19	13	35	43	59	48	73	45	69	69	55	90	89	04	22	-05	--	674	674	674	674	674	674	674	98.36	21.58	674
GPA Key-Total Sample	20	16	37	45	58	51	74	46	72	70	52	91	89	00	22	-09	99	--	674	674	674	674	674	674	103.98	19.99	674
Rank in Class Key-Anglo Sample	21	13	37	45	60	47	72	46	69	68	57	91	90	03	21	-07	99	98	--	674	674	674	674	674	99.34	24.29	674
GPA Key-Anglo Sample	22	14	35	45	59	47	72	45	71	69	54	91	89	00	21	-09	99	100	99	--	674	674	674	674	102.28	21.73	674
Family Income Key-Total Sample	23	32	57	37	60	52	54	58	62	63	59	72	71	-04	02	-12	82	82	83	81	--	674	674	674	102.54	21.41	674
Att.Coll. Key-Total Sample	24	21	48	40	61	51	64	53	66	68	63	83	83	03	08	-05	93	92	94	92	93	--	674	674	101.01	18.98	674
GPA Key-Black Sample	25	16	36	40	57	51	75	44	71	70	45	86	84	-01	29	-09	95	97	94	96	77	87	--	674	105.21	17.13	674
GPA Key-Integrated Schools	26	23	46	47	61	56	74	55	74	73	51	86	87	03	17	-06	96	97	96	96	87	94	94		108.15	21.02	674

Table 11

Intercorrelations, Cross Validities, Means,
Standard Deviations, and Sample Sizes
Anglos in Integrated Schools Cross Validation Sample

Variables		1	2	3	4	5	6	7	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	Mean	s.d.	n
Race	1	--	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			530
Family Income	2	-	--	62	187	-	62	299	461	467	467	224	243	467	467	461	467	467	467	467	467	467	467	467	3.44	1.01	467
Attended College (0=No, 1=Yes)	3	-	-15	--	118	-	123	98	123	123	123	55	68	123	123	123	123	123	123	123	123	123	123	123	.32	.47	123
Anglo, Coll.Prep. (0=No, 1=Yes)	4	-	22	43	--	-	118	94	240	245	245	112	133	245	245	245	245	245	245	245	245	245	245	245	.58	.49	245
Black, Coll.Prep. (0=No, 1=Yes)	5	-	-	-	-	--	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.00	.00	0
Rank in Class	6	-	12	43	62	-	--	98	123	123	123	55	68	123	123	123	123	123	123	123	123	123	123	123	511.15	104.37	123
California IQ Test	7	-	37	32	48	-	59	--	347	348	348	178	170	348	348	343	348	348	348	348	348	348	348	348	109.16	14.03	348
GPA .	11	-	32	49	55	-	89	57	--	523	523	253	270	523	523	517	523	523	523	523	523	523	523	523	23.09	8.96	523
Likeability	12	-	34	41	34	-	64	50	70	--	530	528	272	530	530	524	530	530	530	530	530	530	530	530	30.91	9.85	530
IBRIC Creativity Key	13	-	25	15	30	-	29	27	31	45	--	258	272	530	530	524	530	530	530	530	530	530	530	530	102.58	5.77	530
IBRIC Male GPA Key	14	-	25	47	55	-	77	48	73	73	66	--	0	258	258	253	258	258	258	258	258	258	258	258	104.08	17.44	258
IBRIC Female GPA Key	15	-	53	47	50	-	76	48	68	67	61	00	--	272	272	271	272	272	272	272	272	272	272	272	101.25	19.01	272
Grade (1=Ninth, 2=Twelfth)	16	-	-09	00	-03	-	00	-07	-14	-07	-02	-10	00	--	530	524	530	530	530	530	530	530	530	530	1.23	.42	530
Sex (1=Male, 2=Female)	17	-	00	02	-01	-	27	-01	18	04	-20	00	00	04	--	524	530	530	530	530	530	530	530	530	1.51	.50	530
Age	18	-	-14	-03	-16	-	-22	-15	-22	-14	-07	-18	-06	87	00	--	524	524	524	524	524	524	524	524	15.38	1.38	524
Rank in Class Key-Total Sample	19	-	34	41	59	-	77	47	71	71	57	91	89	05	18	-05	--	530	530	530	530	530	530	530	99.80	22.09	530
GPA Key-Total Sample	20	-	34	43	58	-	79	47	74	73	55	92	90	00	17	-09	99	--	530	530	530	530	530	530	105.57	20.37	530
Rank in Class Key-Anglo Sample	21	-	36	43	60	-	78	49	72	71	50	91	90	03	16	-08	99	98	--	530	530	530	530	530	100.98	24.91	530
GPA Key-Anglo Sample	22	-	33	43	59	-	77	47	73	72	56	92	90	00	16	-10	99	100	99	--	530	530	530	530	103.74	22.22	530
Family Income Key-Total Sample	23	-	50	35	60	-	60	54	61	63	62	73	75	-03	-02	-12	84	83	85	83	--	530	530	530	105.99	21.03	530
Att.Coll. Key-Total Sample	24	-	44	56	61	-	68	51	66	69	66	84	84	04	03	-05	94	92	94	93	94	--	530	530	103.06	19.22	530
GPA Key-Black Sample	25	-	31	39	57	-	79	44	72	72	50	88	85	-02	24	-10	96	97	95	96	79	88	--	530	106.57	17.07	530
GPA Key - Integrated Schools	26	-	40	46	61	-	76	53	75	74	55	88	89	03	12	-07	96	97	96	97	87	94	94	--	110.52	21.15	530

Table 12

Intercorrelations, Cross Validities, Means,
Standard Deviations, and Sample Sizes
Blacks in Integrated Schools Cross Validation Sample

Variables		1	2	4	5	7	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	Mean	s.d.	n
Race	1	--	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			129
Family Income	2	-	--	0	45	65	111	112	112	59	53	112	112	108	112	112	112	112	112	112	112	112	1.77	.88	112
Anglo, Coll.Prep. (0=No, 1=Yes)	4	-	00	--	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.00	.00	0
Black, Coll.Prep. (0=No, 1=Yes)	5	-	47	-	--	16	60	62	62	33	29	62	62	62	62	62	62	62	62	62	62	62	.19	.40	62
California IQ Test	7	-	10	-	00	--	73	75	75	40	35	75	75	71	75	75	75	75	75	75	75	75	91.56	10.64	75
GPA	11	-	42	-	46	45	--	126	126	69	57	126	126	122	126	126	126	126	126	126	126	126	17.02	7.90	126
Likeability	12	-	30	-	55	34	67	--	129	70	59	129	129	125	129	129	129	129	129	129	129	129	23.57	7.99	129
IBRIC Creativity Key	13	-	08	-	12	07	00	01	--	70	59	129	129	125	129	129	129	129	129	129	129	129	102.06	5.37	129
IBRIC Male GPA Key	14	-	25	-	34	16	38	37	54	--	0	70	70	68	70	70	70	70	70	70	70	70	98.87	12.19	70
IBRIC Female GPA Key	15	-	35	-	46	12	47	45	61	00	--	59	59	57	59	59	59	59	59	59	59	59	99.14	14.30	59
Grade (1=Ninth, 2=Twelfth)	16	-	-16	-	-30	-15	-12	02	-19	-20	-11	--	129	125	129	129	129	129	129	129	129	129	1.22	.42	129
Sex (1=Male, 2=Female)	17	-	07	-	03	-03	37	30	-18	00	00	10	--	125	129	129	129	129	129	129	129	129	1.46	.50	129
Age	18	-	-15	-	-38	-23	-12	-03	-11	-16	-11	84	00	--	125	125	125	125	125	125	125	125	15.45	1.36	125
Rank in Class Key-Total Sample	19	-	32	-	48	08	54	53	40	86	84	-02	39	-05	--	129	129	129	129	129	129	129	92.54	17.95	129
GPA Key - Total Sample	20	-	34	-	51	11	56	55	37	85	82	-04	38	-05	98	--	129	129	129	129	129	129	97.53	16.75	129
Rank in Class Key-Anglo Sample	21	-	31	-	47	08	54	51	44	85	85	-03	37	-06	99	97	--	129	129	129	129	129	92.76	20.02	129
GPA Key - Anglo Sample	22	-	32	-	47	09	54	52	39	86	82	-04	38	-05	99	99	98	--	129	129	129	129	96.32	18.24	129
Family Income Key-Total Sample	23	-	46	-	52	20	44	36	58	68	60	-16	11	-18	76	74	78	74	--	129	129	129	88.68	16.50	129
Att.Coll. Key-Total Sample	24	-	42	-	51	18	54	48	52	76	74	-10	23	-09	90	88	91	89	91	--	129	129	92.86	15.15	129
GPA Key-Black Sample	25	-	37	-	51	17	59	61	23	77	77	00	45	-03	93	95	90	93	66	80	--	129	99.78	16.07	129
GPA Key-Integrated Schools	26	-	44	-	56	17	60	57	34	77	77	-01	35	-05	93	95	92	93	78	89	94	--	98.36	17.33	129

The reader will notice that certain variables have been dropped from the three integrated schools matrices in comparison to the three previously presented matrices. The College Board scores were dropped from all three of the integrated school matrices due to extremely small sample sizes. The attended college and rank in class variables were also deleted from the Blacks in integrated schools matrix for the same reason. Subsequently, these two variables will be discussed in reference to the Anglo students only.

The sample size for the analysis of integrated schools was 674 (530 Anglos, 129 Blacks)[10]. The mean family income was 3.11 (approximately $5,200.00), where the Anglo-integrated mean was 3.44 (approximately $5,900.00) and the Black-integrated mean was 1.76 (less than $3,000.00). These results demonstrated that the Anglo-integrated family income mean was slightly higher than the total Anglo sample mean (3.35, approximately $5,700.00), and the Black-integrated family income mean was almost the same as the total Black sample mean (1.79, less than $3,000.00). For the total integrated sample, 50% of the students were female (Anglo=51%, Black=46%), 23% were in the twelfth grade (Anglo=23%, Black=22%) and the average age was 15 in all three integrated samples. On the basis of sample composition, the total integrated sample was quite similar to the overall total sample in terms of sex, but had fewer twelfth grade students and the average age was lower by one year.

The mean California IQ test score for the total integrated sample was 106.04 (n=423, s=15.06). The Anglo-integrated IQ mean was 109.16 (n=348, s=14.03) and the Black-integrated IQ mean was 91.56 (n=75, s=10.64). The Anglo-integrated and Black-integrated California IQ means were very similar to the total Anglo and total Black IQ means, although lower variability was evident for the Black-integrated IQ scores. Further considerations of lower variability will be discussed later in this presentation; although, it was evident that the effects of lower variability functioned in the same general ways as previously indicated without many new additions.

The correlation between race and family income for the integrated sample was .56 (n=579). Race also correlated .45 (n=423) with the California IQ test, and .26 (n=649) with GPA. The family income variable correlated .51 (n=364) with the California IQ test and .42 (n=572) with the GPA criterion. These correlations were quite similar to the results found on the total sample; although, the larger correlations found in the integrated sample between race and GPA and especially family income and GPA (.42) were substantially higher than the correlations between the same variables on the total sample. The Anglo-integrated GPA mean was 23.09 (n=523, s=8.95) and the Black-integrated GPA mean was 17.02 (n=126, s=7.90). In comparison, the total Anglo GPA mean was 21.98 (n=3995, s=9.15) and the total Black GPA mean was 18.53 (n=854, s=8.04). A t-test between the Black-integrated GPA mean and the total Black GPA mean demonstrated that Blacks in integrated schools did not do as well on academic performance measures (assessed by GPA) as Blacks in apparently essentially non-integrated schools (significant at the .05 level). Of course, the likely answer for this is that different ranges of grades were being used in integrated and non-integrated schools, although the actual range of talent being demonstrated was the same for Blacks in integrated and non-integrated schools. Since the GPA criterion correlated .60 with the California IQ test score in the integrated sample, and the integrated Anglo and Black California IQ test means were essentially the same as the total Anglo and Black California IQ test means, respectively, the above conclusion would seem most plausible.

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[10] The race variable was not available for 15 students.

For the total integrated sample, the GPA criterion correlated .72 (n=649) with the likeability control measure, demonstrating a high degree of relationship, but not necessarily causality, between desirability as a student and student performance. It was also interesting to find the likeability control measure correlating .29 (n=659) with race and .43 (n=579) with family income. These results indicated that students from higher socioeconomic levels tended to be more desirable students (as rated by teachers), tended to have higher grades and higher IQ's, and tended to be Anglo.

For the Anglo-integrated sample, the attended college variable correlated .43 (n=118) with Anglo-college preparatory, .43 with rank in class (n=123), and .49 (n=123) with GPA. Anglo-college preparatory correlated .62 (n=118) with rank in class and .55 (n=240) with GPA. Although based on a smaller sample size and therefore less able to be generalized, the correlations between attended college, college preparatory, and the academic performance measures were noticeably higher for Anglos in the integrated sample than for Anglos in the total sample.

For the integrated sample, the California IQ total had a validity of .60 (n=420) against GPA. For the Anglo-integrated sample this validity was .57 (n=347), while in the Black-integrated sample this validity was .45 (n=73). These results were very interesting in that while the integrated samples were smaller and had somewhat smaller standard deviations (especially Black-integrated IQ), the validities for IQ against GPA were higher in the separate Anglo and Black integrated samples than they were in the separate Anglo and

Black total samples. For example, the IQ-GPA validity was .47 (n=1761) in the Anglo sample and .57 (n=347) in the Anglo-integrated sample. For Blacks, the differences between the IQ-GPA validities were less, but the Black-integrated sample was slightly more predictable (.45 versus .43). Further, Anglo-integrated rank in class was predicted at the .59 level (n=98) by IQ, while the validity of IQ against rank in class was .51 (n=880) in the total Anglo sample. Therefore, it would seem that the students in integrated schools sample were somewhat more predictable, in terms of the academic performance criteria and the California IQ test; however, the possibility for sampling error was greater in the integrated samples due to the smaller sample sizes.

The IBRIC male GPA key had cross validities in predicting GPA of .69 (n=322) in the integrated total sample, .73 (n=253) in the Anglo-integrated sample and .38 (n=69) in the Black-integrated sample. The IBRIC female GPA key had cross validities in predicting GPA of .65 (n=327) in the integrated total sample, .68 (n=270) in the Anglo-integrated sample and .47 (n=57) in the Black-integrated sample. These cross validities were roughly comparable to those obtained previously. However, the following observations must be made: (1) Anglo-integrated cross validities for the IBRIC keys were higher (against GPA) than for Anglos; (2) Black-integrated cross validities were lower than those received for Blacks, possibly due to less heterogeneity on the separate GPA criteria (male and female); and (3) the IBRIC GPA keys were more valid for the Anglo-integrated sample than they were for the Black-integrated sample (as was true for the Anglo and Black samples). A disappointing finding was the correlation between the IBRIC male GPA key and race, .13 (n=328), on the total integrated sample. Although barely significant, and substantially lower than the relationships between the other academic predictors and race, this correlation indicated that further investigation may be needed if the BI were to be completely free of any possible racial bias (for males). The investigators were, however, encouraged[11] to find a nonsignificant .04 (n=331) correlation between race and the IBRIC female GPA key for the total integrated sample.

The new BI keys developed in the present study had substantial cross validities against the academic performance criteria in the integrated samples. For example, the new BI key developed on the total integrated sample to predict GPA, variable 26, had a cross validity of .75 (n=523) against the Anglo-integrated GPA criterion, which was the highest cross validity received for the GPA criterion in the Anglo-integrated sample. The highest cross validity obtained for the Anglo-integrated rank in class criterion was .79 (n=123), provided by both the total sample GPA key and the Black-GPA key, a remarkably high cross validity. For the Black integrated sample, the GPA criterion was most significantly predicted by the integrated GPA key with a cross validity of .60 (n=129). The Black-GPA key had a cross validity of .59 (n=129) against this same criterion.

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[11] On a larger sample (the total sample in this analysis) the IBRIC male GPA key correlated only .02 with race.

On the basis of the analysis of the integrated schools, the following observations can be made. First, as in the case of the Anglo and Black samples, the BI keys were substantially more valid than the California IQ test. This may in part have been a result of lower variability for the IQ scores; however, the California IQ test had higher validities against the academic performance criteria in the integrated samples than it did in the Anglo and Black samples.

The cross validities for the new BI keys against the academic performance criteria were, for the most part, slightly higher in the two integrated samples than were the cross validities for the same keys and criteria in the Anglo and Black samples. The standard deviations for the new BI keys and academic performance criteria were essentially the same across the Anglo and Anglo-integrated samples, indicating little, if any, effects due to lower varaibility for the smaller sample sizes of the Anglo-integrated sample. The same was true for the Black sample and Black-integrated sample. However, as was found in the comparisons of the Anglo and Black samples, the Anglo-integrated sample had larger standard deviations on both BI keys and criteria than did the Black-integrated sample, indicating a problem of narrower range for the correlations and validities obtained in the Black-integrated sample (in comparison to the Anglo-integrated sample).

For the Anglo-integrated sample, the new GPA and rank in class BI keys had approximately the same cross validities against the academic performance criteria as the original IBRIC keys. Further, the magnitudes of the cross validities for the Black-GPA key were equally as high as any of the other BI keys, demonstrating again, as in the Anglo sample, that all new academically oriented BI keys were equally predictive of the academic criteria in the Anglo-integrated sample.

For the Black-integrated sample, the Black-GPA key was considerably more valid for predicting GPA than were either of the IBRIC GPA keys. This same result was obtained in the analysis of the Black sample, and again demonstrated the success of a BI key developed on Blacks in predicting academic performance for Blacks. However, as was true for the Black and Anglo samples, the higher prediction obtained from the Black-GPA key did not make Blacks in integrated schools as predictable as Anglos in integrated schools, although the difference was noticeably reduced. This remaining difference could be partially attributed to lower variability on the Black integrated variables. This narrowing of variance was supported by the fact that the new rank and GPA keys built on samples with Anglos included had more "close knit" patterns of cross validities in the Anglo-integrated sample than in the Black-integrated sample.

For the new academic performance BI keys, excluding the integrated GPA key, the correlations between the keys and race ranged from .13 to .16 (variables 19-22 and 25, n's=659)[12]. This represented an increase of approximately 08 hundredths over the correlations between these keys and race in the analysis of the total sample. It was interesting that the Black-GPA key had approximately the same correlations with race as did the Anglo-rank in class and Anglo-GPA keys when all of these keys were used to score all members of the total integrated sample.

The increase in correlations between the academic BI keys, excluding variable 25, and race was expected in the integrated sample. The lower correlations between these keys and race were also expected in the total sample because the majority of Anglos and Blacks were attending schools predominantly of one racial type or the other. Therefore, the keyed items in the BI which dealt with academic achievements were not correlated with race because Blacks generally competed with Blacks and Anglos competed with Anglos. In other words, Black students could generally be as successful as Anglos within their academic Black only setting. However, in the case of the integrated schools, Blacks were in direct competition with Anglos, and as discussed previously, did not perform as well academically as Anglos. There was a larger difference between GPA criterion means and BI key means for Anglos and Blacks in integrated schools than for Anglos and Blacks in the total, less integrated, Anglo and Black samples. In other words, the criterion and BI key means were higher for Anglos in integrated schools than for Anglos in the total sample; and conversely, the criterion and BI key means were lower for Blacks in integrated schools than for Blacks in the total sample. Therefore, since both criterion and BI key means had more pronounced differences in the integrated sample, an increase in correlations between the BI keys and race was inevitable in the integrated samples. This was due to the fact that life history correlates of academic criterion performances between Anglos and Blacks in competition with one another. would have been identified by the BI items if the items were significant predictors of academic performance.

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[12] All preceeding correlations were significant.

Variable 26, the new BI key constructed to predict GPA on the total integrated sample, correlated .23 (n=659) with race, as was expected for a key developed directly on the integrated sample. It was of interest to note that this correlation almost paralleled exactly the correlation of race with the GPA criterion .26. This was in contrast to the California IQ test which correlated .45 with race. In other words, if IQ is defined as a measure of academic readiness (Humphreys, 1969), then the IQ measure does not accurately reflect differences in the performances of Black and Anglo students. Furthermore, since teacher evaluations, i.e., grades, are influenced by family income, and likeability was related to race, the lack of appropriate measurement could be even greater than these results indicated.

The GPA key for the integrated sample was also more valid in predicting GPA in the total integrated sample (.74, n=649) than any other BI key. The remaining new BI keys developed to predict the academic performance measures had cross validities ranging from .69 to .72 (n's=649) against the GPA criterion in the total integrated sample. These cross validities were generally 04 to 05 hundredths higher than the cross validities for the same keys and criteria on the total sample. This provided further evidence of differences between Anglos and Blacks in integrated schools, as opposed to less integrated schools, which in turn provided greater differentiation between races on the criteria, and therefore the BI if it were to be a valid predictor of academic performance. This greater differentiation served to somewhat increase the validities of the BI keys, although at the expense of increasing the correlations between the keys and race.

The family income BI key had a cross validity of .57 (n=579) against the family income criterion in the total integrated sample (.46 for Black-integrated [n=112] and .50 for Anglo-integrated [n=467]). The family income BI key correlated .32 (n=659) with race on the integrated sample, which was expected due to the .56 correlation between the family income criterion and race. The cross validity for this criterion was approximately the same in the integrated sample (.57) as in the total sample (.58). However, the correlations between the family income key and race, and the family income criterion and race, both increased in the integrated sample.

BIOGRAPHICAL CORRELATES OF FAMILY INCOME

The description of the life history characteristics associated with differences in family income will be presented in terms of different categories of experiences, self perceptions, values, aspirations, etc., that characterize students from high and low income homes. The items discussed in this section were those retained in the family income key which had a cross validity of .58 in predicting the family income criterion in the total cross validation sample. This same key correlated .61 with total College Board scores in the total cross validation sample. This very high relationship raises questions about what is being measured by the College Board scores and illustrates the important cumulative nature of the life history correlates of family income. All items retained on this key had significant (.01 level of confidence) item-alternative biserial correlations with the family income criterion, although the majority of correlations were relatively low as described in the Procedure section.

Demographic Variables

As would have been expected, a number of demographic variables correlated with family income. For example, the low income students tended to come from larger families with younger mothers, and the children did not know how many people the father supervised. The parents of low income children tended not to have graduated from high school; the mother often worked outside the home; and the parents were not members of social clubs or community organizations.

Post High School Plans and Aspirations

The lower income children did not plan on attending college, or if they did, they would need outside support as the parents would be able to contribute little, if any, financial assistance. Consequently, children from low income families tended to view college attendance as only somewhat or not very important. They did intend to graduate from high school or to attend college briefly.

As alternatives to attending college, the low income children planned on getting further vocational or technical training, working, entering military service, or they did not have any specific post high school vocational plans.

There appeared to be two extreme methods of coping with post high school activities among the lower income children. They characterized themselves as either making careful and detailed plans or making few plans and letting nature take its course. In contrast, the higher income children took the middle course and characterized themselves as making broad and general plans but not detailed ones.

The lower income children, not surprisingly, expected to earn a lesser amount of income 10 years after they graduated from high school--$7,000--while the higher income children expected to make between $12,000 to $21,000 ten years after the completion of high school. In choosing from a list of nine occupational fields those students who chose the alternative of business and finance tended to come from low income families while the occupational category of scientific fields tended to be chosen by those from high income families.

Values

The lower income children tended to come from families that considered it to be highly important to have a well paying job and to make a lot of money. In contrast, the children from upper income families more often characterized making money and having a well paying job as not very important. Similarly, lower income children tended more often to choose the alternative very important in describing the significance of education in their home whereas, the children who described education in their home as being very important, practically a necessity, tended to come from higher income families. The apparent discrepancy between this item and previous items where low income students describe college attendance as not very important evidently presents another example of realities versus desires.

The lower income students more often chose the alternative--would prefer a minimum of responsibility in their employment--than did the higher income children. When asked to respond on the extent to which they were the kind of individual who becomes so involved in his own activities and interests that he does not mind a lack of friends, the lower income students were characterized by the choice--to some extent. In contrast, the children from high income families were not so involved in their own activities as they chose the alternative--to a small extent--and--not at all--in response to this question. The lack of concern by a number of the low income children regarding social participation was further verified by the item which asked how important was it for them to be popular with other people. Those choosing the alternative--something which concerns me very slightly--tended to be lower income children.

Although lower income children may shun responsibility and social participation, they still value money, as was indicated by their response in describing which was most important of the following: money, people, ideas, and things. Those choosing the money alternative tended more often to be lower income children. In contrast, those choosing the people response tended to be from high income families. In view of their being among the "have-nots" in terms of worldly possessions it is not surprising that those children who felt hard work was not the basic factor of success tended to also be low income children.

The lower income students more often responded that doing unto others was more important in their lives than was seeking self fulfillment, being true to what they believe, or enjoying life to the fullest. Those children who chose--enjoying life to its fullest--were more often from the high income families. The feeling of being bound by inappropriate circumstances and regulations is illustrated in the following item which involved a choice about rules and regulations. Those students who thought that rules and regulations should be followed by all members of an organization tended to be low income students. In contrast, those who felt that rules and regulations should be considered as guides and should not always be followed tended to come from the high income homes.

Another difference in perception of academic performance and strategies among low income students is illustrated by the last item in this section in which students who felt that a sizeable portion of the class should fail in order to keep up the standards were generally students from low income homes as were those choosing the alternative--no one should fail the course except possibly in an extreme or unusual circumstance--. In contrast, those who felt that grading should be on a normal curve, or that only those who do an exceptionally poor job should be failed, were more often students from higher income families.

Activities and Interests

The students who had spent 13 or more hours per week in doing chores around the house tended to be low income students and in addition, the children who had a strong interest in making repairs around the house also tended to be from low income families. In spite of the limited income, the children who saw seven or more movies per month also tended to be low income children, whereas the high income children tended to see only one or two movies per month.

A number of low income children in contrast to the high income students, generally had deprived opportunities for development as they did not participate in organized school activities, playing bridge or chess, in informal discussions or bull sessions, or in playing with chemistry sets, or camping out, and they could not play any musical instrument nor had they had any musical training nor did they know if they liked reading historical novels, literary classics, autobiographies, or biographies. They had not participated in any youth organizations and had either never participated in collecting coins, stamps, rocks, etc., or had begun later--between age 13 and 16--than the high income children.

There was an occasional exception in their motivation pattern as when the students were asked what they did with their spare time: those who responded go to the library tended to be low income children, while those who relaxed with friends tended to be high income students. When asked which of the following would be most interesting about a job: a large salary, interesting work, security, a lot of responsibility, opportunity for advancement, the low income students tended to chose a large salary, security, and opportunities for advancement, whereas, the interesting work alternative and the response concerning responsibility were more often chosen by students who had parents in the high income group. Finally, as might be expected, the students from high income homes stated that they had not contributed to their family income, whereas those in low income families had contributed a great deal, as most of their earnings went to their family.

Childhood Experiences

There were a few items which were difficult to classify in terms of meaningful categories. Thus they were grouped under a category called childhood experiences. These items varied from what the student did when he had a cold (where a response of--take home remedies--was more often chosen by students from low income families) to feelings about various events such as--how did they feel about an electrical storm of thunder and lightening as a child--. Those children who responded that they viewed thunder and lightening as exciting were more often from high income families, whereas those choosing the alternative--found them frightening--were most often from low income families. This item also had important racial differences which were obtained from examining the separate computer runs for different samples. This item which illustrates the meaningful data which could be obtained from analyzing race in terms of life history data is shown below.

As a child how did you feel about electrical storms (thunder and lightning)?	Percentage Responding Blacks (n=846)	Anglo (n=3213)
A. Found them exciting	9%	23%
B. Found them stimulating	3%	6%
C. Found them interesting	17%	22%
D. Found them frightening	51%	33%
E. Never thought about it	19%	16%

The differences in alternative A and D for Anglos and Blacks is very striking and evidently indicates a general lack of security, which other investigators have also reported, and/or possible cultural differences.

Students from high income families felt they had a great opportunity during the past two years to express themselves in some form of creative activity, while students from low income families tended to dominate the choice of no opportunity for such creative activities. Children from low income families had more often started to earn money from a regular job when they were 10 years of age or younger than children from high income families who chose more often the alternative--I haven't worked in a regular job--.

As part of the general pattern reflecting the lack of participation and social involvement, the lower income students were more likely to describe themselves as having seldom or never participated in suggesting the projects of their neighborhood friends (build a tree hut, make a lemonade stand, put on plays, etc.), whereas the high income students more often chose the alternative--frequently--to this question. The low income children had also done less traveling and the traveling they had done began at a later age. When asked how they had reacted to the opportunities and advantages that had been presented to them, the lower income children more often chose the alternative--limited opportunities, but have taken advantage of those available--, while those who chose the alternative--have generally tried to take advantage of any opportunity--, tended to be the high income children.

Self Concept

The children from lower income homes tended generally to consider themselves to be less effective on a variety of different kinds of performances including athletic ability, leadership or executive ability, originality, social ability, ability to succeed in school, to carry through with something in spite of difficulties and distractions, in how well they do most things they have decided to do, in intelligence, creativity, imagination, and in independence.

The data strongly suggest that these children were the "have-nots," not only in material terms which applies equally well, but also in terms of their sense of self-worth.

Peer Group Relationships

A similar group of items with slightly different emphasis was placed in this category. For example, when asked how concerned their friends were about making good grades and going to college, those who responded--not very concerned--tended to be from low income families. Low income children described themselves as rarely or never suggesting somewhat wild ideas during a discussion with their friends. In contrast, the students from high income families characterized themselves as frequently suggesting wild ideas.

What would seem to be a general perception of an inferior status among the poor is illustrated again by an item which asked the student how often he disagreed with someone and argued with him. The students from high income families more often chose the--occasionally--response while the students who responded--rarely--tended to come from lower income homes. Finally, the students were asked how often they had been an organizer or group leader. Those who had never considered themselves to be an organizer or leader of a group and had preferred to remain in the background, tended to be from low income families, while those who chose the alternative--I have been fairly active in student government or community organizations and have acted as an influence in seeing that goals are accomplished--tended to be from higher income families.

Academic Background and Achievement

In accordance with the "have-not" image presented earlier, the items dealing with academic background and achievement presented additional evidence indicating their deprivation even though some are striving to break out of their situation. For example, the children who spent either quite a bit of, or most of their spare time in serious study (not counting their school work) were from the low income families. Yet their academic achievement was somewhat below average, in spite of the fact that those who responded that they liked school very much tended to be from low income families. The students who described school as necessary tended to be from high income families.

The low income students viewed themselves as about average in school grades, whereas the response categories of--much above average--and--somewhat above average--tended to be chosen by students from high income families. The children who replied that they were below the 10th percentile in class rank were also below average in family income. When questioned about their average grades in school the lower income children said C, C- or D+, whereas children from the high income family tended to choose the alternatives of B, B-, or B+, or better. In responding to the question, "What percentage of students could you surpass if you did the very best you could?", the children choosing the 70th percentile alternative were from low income families, while the children who responded between the 90th and 99th percentile were students from high income families. When asked about how well they had succeeded in specific courses the students from lower income families tended to say--fairly well--in science classes, social studies and English classes.

Low income students more often had not attended a nursery school or a kindergarten and more often chose the response--occasionally late--in describing how often they were tardy. They did not know the meaning of pollenization or monopoly until after the age of 12 years.

They more often stated they never looked up material after a test even though they knew they had missed some questions. They more often chose the response--never made excuses--when a teacher or someone else criticized them for something they had done wrong and they had not taken any music classes. Finally, the low income students had less often held a position as an officer of a school club or social group or as a member of the student council.

To summarize, the analysis of family income for these children indicated a wide variety of psychological correlates. The children from lower income homes had experienced a pervasive pattern of deprivation and tended to come from larger families with younger mothers. They had a differing pattern of post high school plans and aspirations with a value system which emphasized financial return but not social participation or responsibility. Generally, they reported a restricted pattern of childhood activities, interests and childhood experiences and had a self concept which denied their competence across a wide range of characteristics from athletics to creativity. Their participation and leadership among their peers was limited and they had a pattern of below average academic achievement even though many of them liked school very much, perhaps because little else was available.

DISCUSSION

The goals of the study were to develop more valid biographical inventory keys for predicting academic performance, especially for Blacks; to examine the life history correlates of family income; and to examine the implications of the data obtained from the five most integrated schools.

The BI keys constructed in the study were substantially more valid in predicting criteria of academic performance than any of the other non-biographical predictors, IQ, and the College Board scores, included in the study. Furthermore, the validities of the biographical scores were unusually high as cross validities in the .70's were obtained on large samples of students. Stated in other words, life history experiences, self perceptions, environmental influences, attitudes, etc., taken together were more valid indicators of academic performance than were tests which focused upon a limited number of intellectual factors. This was true across all samples studied in the present investigation--the total cross validation sample, the Anglo sample, the Black sample, and the integrated school samples. For example, the BI key constructed on Blacks to predict GPA had cross validities of .73 (n=2332) against rank in class and .67 (n=4849) against GPA in the total sample, while the same key had cross validities of .75 (n=1891) and .65 (n=441) against the class rank criterion in the Anglo and Black samples, respectively. In comparison, the California IQ test and College Board had validities of .48 (n=1070) and .47 (n=1124) respectively, against rank in class in the total sample, and .46 (n=2282) and .52 (n=1120) against GPA in the total sample. These two tests also had comparably lower validites than the BI keys in the Anglo and Black samples.

The BI key constructed to predict college attendance was more valid in the larger samples (total, Anglo, and Black) than any other measure that could be used as a predictor for forecasting the decision about whether or not an individual would continue his education beyond high school. These other measures included high school rank, high school GPA, whether or not the student was enrolled in a college preparatory course, IQ test scores, College Board scores, and family income. These results for predicting college attendance could have some important implications for reducing the loss of talent, as early counseling could contribute to the more effective development of student potential.

The new BI keys constructed in this study provided additional information concerning the potential applications of biographical data for different samples and different criteria. Prior to this study, the validities of the BI for predicting Black academic performance were considerably lower than those for Anglos. The new keys constructed for Black academic performance resulted in a substantial improvement for the prediction of Black academic performance (from .54 to .65), although the level of prediction for Blacks was still less than that obtained for Anglos (.75). According to the results obtained to date, many of the life history correlates of academic success are similar for Blacks and Anglos. That is, keys built on Blacks were as valid for Anglos as keys constructed on Anglos and applied to Anglos. However, the validities of both kinds of keys were somewhat lower for Blacks than Anglos. Therefore, an important future research endeavor would be to construct additional items dealing with the Black culture which could raise the validities for Blacks and possibly result in differential validities for Black and Anglo keys when applied to samples of the opposite race.

An encouraging finding in the data analysis of Blacks occurred where it was found that taking college preparatory courses was moderately associated with rank and GPA. This suggested that the teachers and the educational system were directly concerned with the development of Black talent. However, the data also indicated that additional efforts are needed since such a small percentage of the Blacks actually attended college (15%).

The family income variable had a substantial relationship with race (.50) in the total sample. The BI key constructed to predict the family income measure had moderate to high cross validities against that criterion across the samples studied, with the highest cross validity (.58, n=4034) in the total sample where there was greater variability in family income. However, moderate cross validities were also obtained in the Anglo sample (r=.54, n=3216), and the Black sample (r=.42, n=818).

The wide variety of items included in the BI key constructed to predict family income indicated the pervasive effects of lower income. These effects were not limited to material deprivations, but also involved attitudes, self concepts, values, plans and aspirations, peer group relationships, etc. Many remedial programs are concerned with providing enrichment, stimulation and early learning experiences, and while the objectives of such programs would be difficult to question, effecting changes in attitudes, self concepts, etc., may be very difficult. The ultimate success of such programs may rest largely upon the degree to which changes can be brought about in these often subtle and more difficult to change aspects of behavior. Consequently, research on the biographical correlates of family income should be reviewed for potential application into such remedial programs.

Throughout the study the relationships of race with the other variables were complex and the lack of other important information made the situation even more difficult. The data obtained in the present study, which was limited to one state, suggested that: (1) Blacks were equal to Anglos in academic performance if the effects of family income were controlled[13]; (2) on the BI academic keys, the non-intellectual biographical correlates of academic achievement, Blacks were equal to or slightly superior to Anglos if family income were controlled[14]; (3) Blacks were slightly superior to Anglos on the creativity key if family income were controlled[15]. Without considering the effects of family income, no difference existed between Blacks and Anglos on the creativity key. The degree to which the creativity key is a valid indicator for Blacks, or for that matter at the high school grade level, is a matter that needs further research. However, since the items in the creativity key were all validated on adult scientists and engineers, the life history correlates of such performances could be important as indicators of potential among Blacks; (4) the correlations of the intellectual tests were greater (e.g., the r of the California IQ test with race in the integrated sample was .45) than correlations of race with GPA, (integrated sample r=.26), which suggests that the intellectual tests may not accurately reflect Black student performance. Blacks scored significantly lower on the intellectual tests, even when the effects of family income were controlled. However, as mentioned previously, the family income measure by itself was not in any way a satisfactory control for differences in environmental factors.

In contrast with the intellectual measures, the BI keys practically paralleled student performance, that is, the keys constructed on various samples correlated with race to the same degree (or less) than race correlated with GPA and class rank. However, the question can still be raised as to which is more representative of reality--intellectual tests or academic performance. In other words, what is the ultimate objective of such measures? It would seem that ultimately education and assessment techniques should be more concerned with developing and measuring individual potential and building competence for world of work activities rather than emphasizing the accumulation of past knowledge. Extensive development of a variety of teaching strategies designed to foster higher levels of performance across different talent dimensions has already occurred as described in the Eighth International Creativity Research Conference (Taylor, 1970). As the number of talent dimensions increase so does the probability that all students will be above average in one or more dimensions of performance.

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[13] The partial correlation between GPA and race with family income controlled, were .03 (not significant) in the total sample and .03 (not significant) in the integrated schools sample.

[14] The partial correlations between the Black-GPA key and race, with family income controlled were -.10 (signficant at the .05 level) in the total sample and -.05 (not significant) in the integrated schools sample.

[15] The partial correlations between the IBRIC Creativity Key and race, with family income controlled, were -.12 (significant at the .05 level) in the total sample and -.09 (significant at the .05 level) in the integrated schools sample.

Since both intellectual devices and academic performance measures have had limited validities in predicting adult achievement, particularly in the scientific fields (Hoyt, 1966; Ellison, James, Fox, and Taylor, 1969), there is room for doubt about heavy reliance on any one form of assessment. Since our educational system is in a period of rapid transition and development, the best strategies are probably represented through a combination of assessment techniques, e.g., biographical data and intellectual assessments without heavy reliance on any one approach.

All of this discussion points to a redefinition of academic success and the process of education. Such a redefinition is now underway. For example, the University of Ohio has eliminated the grade of F (failure) as it will no longer appear on students records. Students will simply not get credit for any course not completed with satisfactory grades. Furthermore, the grade of D (below average) can be removed from the student's record at the option of the student under certain conditions until 45 credit hours are accumulated with a D grade. The University of Albany has done away with all letter grades, going to a complete pass-fail system, and the University of Utah will no longer consider the first grade in a course, only the grade from the last time it was completed. All of these grading systems are more concerned with the development of success and the elimination of failure as part of the educational process.

Still another trend on the horizon is the concept of open admissions. For example, the State University System of New York has committed itself to open admissions by 1975, which means that intellectual tests as selection devices will undergo a redefinition of purpose. In short, future student assessments are more likely to be concerned with measuring student potential across various areas of performance so that more effective counseling, guidance, and placement in a variety of educational programs can occur.

In the interim period when selection decisions are going to be made, it would seem only just and rational to use the most valid information available. Biographical data have shown a consistent pattern of high validities against a variety of criteria across a variety of samples with no built-in discrimination in terms of race. Therefore, the results of this study and others indicated that biographical data should be evaluated further and utilized in conjunction with other available information.

A number of future research topics appear appropriate in view of the results obtained. The success of biographical data in predicting college attendance as well as academic performance suggests that biographical data could be effectively used for talent loss and the prediction of dropouts. In addition, there are a wide variety of other behaviors which would be of interest to examine with biographical data, especially drug abuse and delinquency.

Although race was not item analyzed in this study to highlight differences in Blacks and Anglos, such an analysis would appear to be worthwhile as indicated by the item on electrical storms, which a much larger percentage of Blacks viewed as frightening than did Anglos.

The potential problem of faking on biographical data needs further investigation although if the emphasis in measurement becomes one of counseling and guidance rather than one of selection, such a potential problem may never be realized. Also, as multiple scores are developed on a single Biographical Inventory which have low interrelationships, the more difficult it should be to fake on more than one key simultaneously. The previously mentioned strategy of developing additional biographical items for Blacks to bring the level of prediction for Blacks equal to the level obtained for Anglos also represents an important future research challenge.

SUMMARY

The present study concerned an investigation of three objectives relating to the identification of talent and understanding its development and origins in terms of life history data. The sample included 11,048 Anglo and Black high school students, in either the ninth or twelfth grades, enrolled in the North Carolina public school system. For 10,128 students on whom a variable for racial origin was available, 8,319 were Anglo and 1,809 were Black. The sample was approximately equally split between the ninth and the twelfth grades and males and females. The three central objectives of the study were: (1) to construct separate empirical prediction procedures on Anglos and Blacks to predict academic performance criteria, i.e., rank in class and GPA; (2) to construct an empirical scoring procedure for a Biographical Inventory (BI) to predict estimated family income in order to provide information about the socio-economic and biographical correlates of such data; and (3) to conduct a separate analysis on the five most integrated schools in the sample in order to examine the interrelationships of the measures in this selected sample.

The present investigation built upon data already available from a previous study (IBRIC, 1968). This previous study sought to investigate the general effectivenss of a Biographical Inventory, developed by the investigators, which yielded a creativity score and an academic performance score. The design of the study permitted a comparison of the biographical scores with achievement measures, such as the College Board test and IQ, in the prediction of academic performance. The relationships between all measures and race were also investigated. The results from the previous study demonstrated that unusually high cross validities could be obtained in predicting academic performance criteria from biographical data, higher than validities from any of the other predictor measures included in the study. Furthermore, the scoring keys developed on the biographical data did not discriminate in terms of race, i.e., Blacks had mean BI keyscores similar to Anglos. The conventional academic measures all showed the usual pattern of discrimination in terms of race, e.g., the College Board total score correlated .42 with race. The results also demonstrated that Anglo students were more predictable (cross validities in the .70's) than Blacks.

The present study was carried out by constructing empirical scoring keys from the biographical data to predict selected criteria across four different samples. The key generation samples were: (1) a

total sample which included all Anglos and Blacks, with odd identification numbers, (2) an Anglo sample comprised of the Anglos from the above total sample, (3) a Black sample comprised of Blacks from the total sample, and (4) an integrated sample, which included students from the total sample who were enrolled in the five most integrated schools in the study. Scoring keys were constructed for the BI to predict rank in class, GPA, family income and whether or not a student had attended college on the total sample. Additional BI keys were constructed on the Anglo sample to predict rank in class and GPA, on the Black sample to predict GPA, and on the integrated schools sample to predict GPA. The cross validation samples, encompassing students with even identification numbers, paralleled the key generation samples, with the exception that samples were also selected for Anglos in integrated schools and Blacks in integrated schools (samples 5 and 6). All BI scoring keys generated on the four key generation samples were used to score all members of all cross validation samples. It was therefore possible to examine the different cross validities of every new BI key within every sample regardless of where the BI key was generated, e.g., the cross validity of a GPA key built on Anglos applied to the Black sample to predict the academic performance of Blacks.

The new biographical keys constructed in the present study to predict academic performance measures demonstrated unusually high degrees of predictive efficiency against the academic performance criteria. In the total cross validation sample (combined Anglos and Blacks), the BI key built to predict GPA on the total key generation sample had cross validities of .74 (n=2332) against rank in class and .67 (n=4849) against GPA. The remaining academic BI keys had similar cross validities against class rank and GPA. The above validities for the new BI academic keys were without exception the most valid predictors of academic performance. For example, the College Board total score had validities of .47 (n=1124) against rank in class and .52 (n=1120) against GPA. With the exception of the GPA key constructed for integrated schools, the new BI keys built to predict GPA and class rank in the total sample, the Anglo sample and the Black sample correlated between .06 and .08 with race. Although these correlations were significant and higher than those for the keys developed in the earlier study, they showed less than 1% of variance overlap. Furthermore, the correlations between the BI keys and race were much lower than the correlations between race and IQ (.44), and race and the College Board total score (.42).

In view of the differential relationships between the various kinds of measures and race and in view of the higher validities for the biographical data in predicting academic performance, these results suggest that biographical data could make an important contribution to selection decisions.

On the Anglo sample, the new BI keys for predicting academic performance showed little improvement over the results previously obtained, as both sets of the BI keys validated in the .70's. However, on the Black sample substantial improvement was obtained in using biographical data to predict rank in class (from .54 to .65) and high school grades (from .48 to .60). However, Anglos were still more predictable than Blacks, although this difference was noticeably reduced.

In the analysis of the integrated schools, the results indicated that the academically oriented BI keys had slightly higher but still low correlations with race (from .13 to .16), except for the key constructed to predict academic performance within the integrated schools which had a correlation of .26 with race. However, in the integrated schools sample the BI keys closely paralleled the relationships of race and academic performance which were also higher for this sample. In general, the validities obtained in the Anglo-integrated and Black-integrated samples were similar to, and at times higher than, those obtained on the Anglo and Black samples. The BI continued to be the most efficient predictor of academic success.

As the relationships between race and academic performance and race and Biographical Inventory keys were corrected for differences in family income, the resulting relationships indicated that Blacks were equal to Anglos on academic performance measures and on the Biographical Inventory keys except for the Creativity Key where they were slightly superior.

The family income variable, which correlated .50 with race in the total sample and .56 with race in the total integrated sample, had a meaningful pattern of relationships throughout the analysis. The cross validities of the BI key constructed to predict family income had moderate to high cross validities across all the samples studied. The biographical correlates of family income followed a broad pervasive pattern of deprivation, including lower self concepts, differing values, lower academic achievement, deprived patterns of activities and interests, restricted childhood experiences, etc. These results indicated that such variables could be useful in designing special programs for the disadvantaged.

The BI keys constructed to predict whether or not the student pursued his education by attending college were generally more significant in predicting the attended college variable than any other measures included in the study, such as high school GPA, high school rank, enrollment in a college preparatory course, IQ scores, College Board scores, and family income.

The results obtained in the investigation were discussed within the broad context of selection and assessment devices generally used for the identification and development of talent. This involved a potentially greater emphasis in the future on the counseling, guidance and placement functions of tests as well as using a combination of the most valid instruments available for selection and counseling decisions. If further research continues to demonstrate the significant contribution of biographical data, such information should be utilized in conjunction with other approaches for the identification and development of talent.

REFERENCES

Ashby, W. R. Chance Favors the Mind Prepared. *Science*, May, 1970, *168*, No. 3933.

Biaggio, A., & Stanley, J. C. Prediction of freshmen grades at Southern state colleges. Paper presented at the meeting of the Ninth InterAmerican Congress of Psychology, Miami Beach, December, 1964.

Bittner, R. H. Quantitative predictions from qualitative data: Predicting college achievement from biographical information. *Journal of Psychology*, 1945, *19*, 97-108.

Bowers, C. E., & Campbell, E. Q. Aspiration of Southern youth: A look at racial comparisons. *Transaction*, 1965, *2*, 24.

Britt, M. Follow-up study of North Carolina students. Richardson Foundation. This study is in process, obtained through personal communication, 1970.

Dreger, R. M., & Miller, K. S. Comparative Psychological Studies of Negroes and Whites in the United States: 1959-1965. *Psychological Bulletin* Monograph Supplement, Sept. 1968, *70*, No. 3, Part 2.

Education Power: Talent Search Helps Poor Realize Their Potential. *Science*, January, 1969, *163*, No. 3862.

Ellison, R. L. The relationship of certain biographical information to success in science. Unpublished master's thesis, University of Utah, 1959.

Ellison, R. L., James, L. R., & Carron, T. The prediction of scientific performance criteria with biographical information. Unpublished report submitted to Ethyl Corporation, Institute for Behavioral Research in Creativity (IBRIC), 1968.

Ellison, R. L., James, L. R., McDonald, B. W., & Taylor, C. W. The prediction of scientific and engineering performance with biographical information. Unpublished report submitted to North American Rockwell, Inc., Institute for Behavioral Research in Creativity (IBRIC), 1968.

Ellison, R. L., James, L. R., Fox, D. G., & Taylor, C. W. The analysis and prediction of Dow scientific performance. Unpublished report submitted to Dow Chemical Company, Institute for Behavioral Research in Creativity (IBRIC), 1968.

Garrett, H. E. Klineberg's chapter on race and psychology: A review. Mankind Quarterly, 1960, 1, 15-22.

Goldsmith, D. The use of the personal history blank as a salesmanship test. Journal of Applied Psychology, 1922, 6, 1948-1955.

Goslin, D. A. The Search for Ability. Russell Sage Foundation. New York: 1963.

Gray, S. W., & Klaus, R. A. An experimental pre-school program for culturally deprived children. Paper presented at the meeting of the American Association for the Advancement of Science, December, 1964.

Hansen, P. J. The relationship of certain biographical information to the academic and behavioral adjustment of high school boys. Unpublished doctoral dissertation, University of Utah, 1950.

Hoyt, D. P. College grades and accomplishments: A review of research. The Educational Record, 1966, 47, 70-75.

Hoyt, D. P. Generalized academic prediction in four-year colleges. Personnel and Guidance Journal, 1968a, in press.

Hoyt, D. P. Forecasting academic success in specific colleges. American College Testing Program. No. 27. Published by Research and Development Division, August, 1968b.

Humphreys, L. G. Racial Differences: Dilemma of College Admissions. Science, October, 1969, 166, No. 3902.

IBRIC. The ALPHA Biographical Inventory. Prediction Press, Greensboro, North Carolina, 1968.

James, L. R., Ellison, R. L., McDonald, B. W., & Taylor, C. W. Effectiveness of biographical information in predicting teacher assessments of creativity and leadership. Paper presented at the American Psychological Association Convention, 1968.

Jensen, A. How much can we boost IQ and scholastic achievement? Harvard Educational Review, 1969, 39, 7-123.

Jensen, A. Reducing the heredity, environment and uncertainty: A reply. Harvard Educational Review, 1969, 39, 449-483.

Jensen, A. A scientist's variations on a disturbing racial theme. Life, No. 22, June 22, 1970, 68.

Katz, I., & Benjamin, L. Effects of white authoritarianism in biracial work groups. Journal of Abnormal and Social Psychology, 1960, 61, 448-456.

Katz, I., Goldston, J., & Benjamin, L. Behavior and productivity in biracial work groups. Human Relations, 1958, 11, 123-141.

Levin, D. E. The Prediction of Academic Performance. Russell Sage Foundation. New York, 1965.

Miner, J. B. Intelligence in the United States. Springer Publishing Co., Inc. New York, 1957.

Nelson, B. Education Power: Talent search helps poor realize their potential. Science, January, 1969a, 163, No. 3862.

Nelson, B. State Universities: Report terms desegregation "largely token". Science, June, 1969b, 164, No. 3884.

New Dimensions in Higher Education. No. 32. Applications of the Science of Measurement to Higher Education. Contract Number OEC-2-6-961722-1742. Duke University and U. S. Office of Education.

Parker, S., & Kleiner, R. Status position, mobility and ethnic identifications of the Negro. Journal of Social Issues, 1964, 20, 85-102.

Parrish, J. A., & Drucker, A. J. Personnel research for Officer Candidate School. USA TAGO Personnel Res. Br. techn. res. Rep., 1957, No. 117, 22.

Pasamanick, B., & Knobloch, H. The contribution of some organic factors to school retardation in Negro children. Journal of Negro Education, 1958, 27, 4-9.

Peisach, E. C. Children's comprehension of teacher and peer speech. Child Development, 1965, 36, 467-480.

Price, J. S. The effectiveness of the Alpha Biographical Inventory in prediction of first semester grades of Wake Forest University freshmen. Unpublished report, 1969.

Roy, H., Brueckel, J., & Drucker, A. J. Selection of army and air force reserve officer training corps students. USA Personn. Res. Br. notes, 1954, No. 28, 9.

Ruch, F. Research notes on "Seniority and testing under fair employment laws". The Industrial Psychologist, April, 1970, 7, No. 2, 13.

Schagrin, M. L. Who succeeds in graduate school? Science, April, 1969, 164, No. 3877.

Sexton, P. Negro career expectation. Merrill-Palmer Quarterly, 1963, 34, 9-27.

Shuey, A. M. The testing of Negro intelligence. (2nd ed.) New York: Social Science Press, 1966.

Stallings, F. H. A study of the immediate effects of integration on scholastic achievement in the Louisville public schools. Journal of Negro Education, 1959, 28, 439-444.

Stanley, J. C. Achievements by the disadvantaged. Science, February, 1969, 163, No. 3868.

Stephensen, R. M. Mobility orientation and stratification of 1,000 ninth graders. American Sociological Review, 1957, 22, 204-212.

Super, D. E. Appraising Vocational Fitness. New York: Harper & Row, 1949.

Sutton, G. F. Chance favors the mind prepared. Science, May, 1970, 168, No. 3933.

Taylor, C. W. (Ed.). The second (1957) University of Utah research conference on the identification of creative scientific talent. Salt Lake City: University of Utah Press, 1958.

Taylor, C. W., & Barron, F. (Ed.). Scientific creativity; its recognition and development. New York: Wiley, 1963.

Taylor, C. W. (Ed.). Widening horizons in creativity. New York: Wiley, 1964a.

Taylor, C. W. (Ed.). Creativity: progress and potential. New York: McGraw-Hill, 1964b.

Taylor, C. W. 8th (1970) Creativity research conference, Buffalo-Niagara Falls, N. Y. Manuscript in preparation.

Taylor, C. W., & Ellison, R. L. Biographical predictors of scientific performance. Science, 1967, 155, 1075-1080, No. 3766.

Taylor, C. W., Ellison, R. L., & Tucker, M. F. Biographical information and the prediction of multiple criteria of success in science. NASA Research Project, NASA-105, 1964. Final unpublished report.

Taylor, H. C., & Russell, J. T. The relationship of validity coefficients to the practical effectiveness of tests in selection: discussion and tables. Journal of Applied Psychology, 23, 1939, 565-578.

Williams, W. E. Life history antecedents of volunteers vs. non-volunteers for an A.F.R.O.T.C. program. Paper presented at Midwestern Psychological Association, Chicago, 1961.

Wolfle, D. Chance, or human judgment? Science, February, 1970, 167.